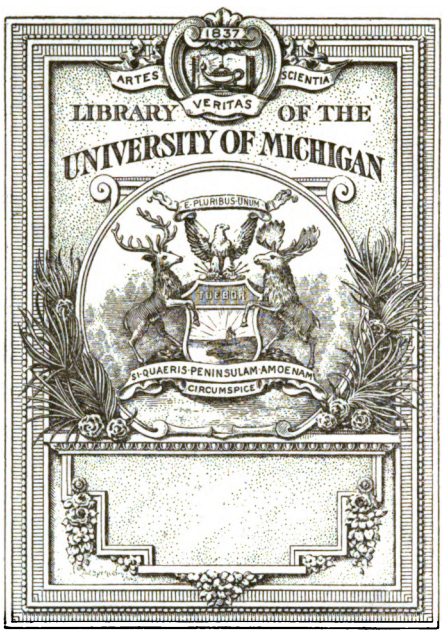
Annual Report

Rhode Island. State Board of Health



TWENTY-FIRST ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH,

OF THE

STATE OF RHODE ISLAND,

FOR THE YEAR ENDING DECEMBER 31, 1898.

PROVIDENCE, R. I.
E. L. FREEMAN & SONS, STATE PRINTERS.
1901.

MEMBERS

OF THE

RHODE ISLAND STATE BOARD OF HEALTH.

	Post Office Address.	
ALBERT G. SPRAGUE, M. D., *President*	RIVER POINT	KENT COUNTY.
SAMUEL M. GRAY, C. E.	PROVIDENCE	PROVIDENCE COUNTY.
JOHN C. BUDLONG, M. D.	PROVIDENCE	PROVIDENCE COUNTY.
REV. GEORGE L. LOCKE	BRISTOL	BRISTOL COUNTY.
ALEXANDER B. BRIGGS, M. D	ASHAWAY	WASHINGTON COUNTY.
PETER F. CURLEY, M. D.	NEWPORT	NEWPORT COUNTY.
GARDNER T. SWARTS, M. D	PROVIDENCE	PROVIDENCE COUNTY.

GARDNER T. SWARTS, *Secretary.*

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In compliance with the General Laws, the Annual Report of the Public Works Department is herewith respectfully submitted.

Chester I. Swarts,

Secretary.

GENERAL REPORT.

The work of the State Board of Health during the year has been a continuation of study of the various conditions pertaining to the public health, especial use being made of the more recent methods of diagnosis and investigation which have been made available during the past few years.

CONTAGIOUS DISEASES.

Monthly reports have been received from the various towns, giving the number of cases of the various contagious diseases occuring, including diphtheria, scarlet fever, and typhoid fever. By this means a continuous record has been kept of the prevalence of any of these diseases, and the resulting annual compilation of these reports admits of the comparison of the months and years. The attention given to these diseases and the interest shown by this department has served to increase the attention of the local health officers to the care of and control of these diseases.

WATER SUPPLIES.

The conditions of the water supplies of the State have remained the same as given in the previous report.

The city of Providence continues to receive its supply from the Pawtuxet river, at the pumping-station at Pettaconset. The possibility of contamination from vaults or cess-pools along the banks of the river has been removed. Stable yards, surface flow from streets and from farm lands still menace the supply. Attempts

are made to prevent dye-stuffs from finding their way into the river, by a process of sedimentation and filtration; but as the filters at times become clogged, there is the possibility of the whole amount of waste dye-stuffs from certain factories being permitted to run into the stream. Little or no attention is given to the prevention of bathing in the stream, which is a common practice during the summer months. Should the storage reservoirs be used for a similar purpose, objection would be raised, although the same water is possibly contaminated in this way before entering the reservoirs. The danger from this procedure would occur probably only as the result of a person using the river as a public bath when he was suffering from or had been suffering from some disease of the intestinal tract.

The supply of the city of Woonsocket has been closely guarded, it being made possible by the control, assumed by that city, of the water-shed, and by ownership of the same.

Although the supply of the city of Newport recently increased by increase in storage capacity, yet a greater demand will be made for reservoir service in the future.

The Bristol Water Company still supplies the towns of Bristol and Warren. The endeavor to acquire the rights of this supply by the town is still in the hands of a master of arbitration. The quality of the water remains the same, being bacteriologically and chemically good, yet possessing a high color and earthy taste during the summer months.

The water supply of the city of Pawtucket still maintains its high quality, but is filtered through coarse gravel and charcoal, which, while it serves to remove the gross particles of suspended matter, yet acts as a strainer merely and does not remove any form of dangerous pollution which might enter the river at any point. It is believed, however, that the water-shed and the banks of the stream are well guarded against accidental contamination in any way.

The East Providence Water Company still supplies a portion of the town of East Providence, the water being taken from the Ten

Mile river. This stream passes through a populous district of Attleboro and North Attleboro, having a large number of factories upon its banks, and receives the sewage wastes from at least 3,500 inhabitants, together with dye-stuffs and acid washings from jewelry manufactories. An endeavor is to be made in the near future to obviate this condition, by some means of purification or removal of the conditions causing the contamination, as far as may be practicable. The board has made two inspections of the river, reports of which will be found in the body of this report.

EXAMINATION OF WATER SUPPLIES.

The examination of the water-shed and the banks of the Pawtuxet river which supply the city of Providence is still continued by the city, two inspectors patrolling the banks continuously. Any possible source of contamination which might arise from increased rain-fall or by the placing of dangerous materials upon the banks of the stream is corrected as quickly and as quietly as possible. Such conditions accrue more from ignorance than from intention.

A semi-monthly chemical analysis of the water taken at the Pettaconset pumping-station is made by the city of Providence, while a monthly bacteriological and chemical analysis is made of the waters of this river by this board, the samples being taken from the villages of Hope and Washington above the points of pollution, and also a sample at the Pettaconset pumping-station.

This data has been obtained for several years, and has now already proved of great value to the city of Providence in determining the comparative value of the waters now used and the conditions of the waters on the north and south branches of the river.

The examination of the waters of the Blackstone river at two points inside the Massachusetts line has been continued. At Worcester a certain amount of contamination has been caused in years past from the presence of sewage in the river. Analyses of the waters of the river at several points in the State of Massachu-

setts have been carried on by the State Board of Health of that State. These analyses were for the purpose of adding material information to that data. These latter analyses have been made possible only by the gratuitous work of the State chemist, Charles E. Swett, and of the Rhode Island laboratory, which has charge of all of the bacteriological work of the board.

EXAMINATION OF SPUTUM FROM CASES OF SUSPECTED TUBERCULOSIS.

The free examination by the board of all samples of sputum received from cases of suspected tuberculosis, for physicians only, has been continued with gratifying results. By this means a physician is assisted in making an early discovery of the presence of this disease and is able to give to his patient more prompt and assiduous attention. The patients are at times made aware of the fact that they are suffering from this disease while in its incipiency, and are enabled to obtain for themselves such treatment as may be available.

The public receives the benefits from this work by the greater care of the patient to avoid indiscriminate expectoration, thus reducing in a great measure the opportunities of spreading the disease. Money spent by the State in this manner is a good investment.

EXAMINATION OF CULTURES IN CASES OF SUSPECTED DIPHTHERIA.

The examinations of the secretions of the throat and the growths therefrom upon a nutrient blood serum, for physicians, in cases suspected to be diphtheria has been continued with the same advantage to the physician, the public, and the health officer as in previous years. Many cases of simple pharyngitis presenting no clinical symptoms of diphtheria have been found to contain the organisms which produce this disease; the corroboration of the bacteriological diagnosis being confirmed later by the appearance of the membrane and the train of symptoms to be found in diphtheria. This system of control was commenced by this board in

1894, Rhode Island being the first State to establish the system as a State, the city of New York having been the pioneer health department in this matter.

SPECIAL APPROPRIATIONS.

The regular annual appropriation of $3,500 was utilized for the general work of the board. A special appropriation of $1,000 was made by the legislature for the special use of investigation and prevention of diphtheria. A like appropriation was also made available for examination of sputum and the study of tuberculosis.

PERSONNEL OF THE BOARD.

The terms of membership of Dr. John C. Budlong, member of the board from Providence county, and Rev. George L. Locke, member of the board from Bristol county, expired by limitation July 1, 1898.

Governor Elisha Dyer, at the January session of the General Assembly, with the advice and consent of the Senate, re-appointed Dr. Budlong and Rev. Mr. Locke for a term of six years from July 1, 1898.

SECRETARY'S REPORT.

TOWN SANITATION.

1898.

REPORTS FROM TOWNS,

IN RELATION TO SANITARY IMPROVEMENTS, ETC.

It has been observed, in the previous issues, that a complete annual report of a State Board of Health properly includes an account of the measures taken each year by the municipal authorities, corporations, or individuals for the promotion of the health of the communities under their respective supervision or control. In order, therefore, to ascertain the facts in relation to such measures, and for the purpose of presentation in this report as in the reports heretofore issued, and in the continuance of the design to keep well informed of all proceedings throughout the State on the part of town or city councils or any form of municipal authority in the appointment of health officers or boards of health, and in the direction of improvements which have in view and seem to promise the promotion of public health by the abatement of nuisances or the removal of unsanitary conditions and surroundings, or by the introduction of water for general use, or construction of sewers, or the establishment of other public works which may not only be of great public utility and convenience but also serve in some measure, large or small, in the prevention of disease, the secretary has, as heretofore, solicited replies from the town and city clerks of the several towns and cities, or other municipal officers, in answer to questions proposed in a circular sent for that purpose.

It is designed and hoped that a connected history may thereby be secured of all sanitary improvements of a public character in all parts of the State, from year to year; and the gradual awaken-

ing of the citizens of the different towns to the necessity of sanitary public measures thereby be shown; and also whatever intelligent appreciation of such necessity, and whatever public spirit in existence in the towns there may be, may be known as manifested by the readiness with which needed sanitary measures are adopted.

The following is the form of circular sent at close of the year 1897:

CIRCULAR No. 130.

OFFICE OF SECRETARY OF STATE BOARD OF HEALTH,

48 WEYBOSSET STREET.

PROVIDENCE, R. I., Jan. 1, 1898.

To the Town Clerk:

It is, by statute law, made the duty of the secretary of the State Board of Health to make inquiries of town or city clerks, or of the clerks of local boards of health, in regard to the general health and sanitary condition of the towns, and also in regard to measures taken for the improvement of the same, as may be seen by the following section from the

PUBLIC STATUTES, CHAPTER 83.

SEC. 6. The secretary of the said board shall make inquiry, from time to time, of the clerks of town and local boards of health, and practicing physicians, in relation to the prevalence of any disease, or knowledge of any known or generally believed source of disease, or causes of general ill-health, and also in relation to the proceedings of the said boards of health in respect to acts for the promotion and protection of the public health, and also in relation to diseases among domestic animals, in their several towns and localities, respectively; and the said clerks of town and local boards of health and said practicing physicians shall give such information in reply to said inquiries, of such facts and circumstances as have come to their knowledge.

In order to make complete the annual report of this board to the General Assembly, the secretary would respectfully ask your co-operation by answers to the following questions:

1. Has any work for the promotion of public health been contemplated

or completed in your town by the town authorities, or by private enterprise, during the year? If any, please state what.

2. If by introduction or extension of water service for general use, please state what proportion of the population, by estimation, was supplied with the same at the end of the year.*

3. If city or town has sewage system, state the aggregate length of sewers, by estimation or otherwise, and about what proportion of the population has drainage connected with them at the end of the year.*

4. If by new ordinances in abatement of nuisances, or for any sanitary purpose, please send copy of same; also state how far, to your best knowledge, all the sanitary ordinances have been enforced. Copies of town ordinances especially desired.

5. Has your town any legal board of health beside the town council? If so, please give the names of the officers of the same.

6. Please give the names of the health officers of your town.

7. Has gratuitous vaccination been provided in your town during the past year? What proportion of the population was vaccinated, according to your best knowledge?

8. Have undertakers promptly sent in their returns of death? Please give names of any who do not. (See Public Statutes, Chap. 85, Sec. 1.)

9. Do clergymen make returns of marriages promptly each month, as required by Public Statutes, Chap. 85, Sec. 4?

Thanking you in advance for your assistance, I am,

Yours truly,

GARDNER T. SWARTS,

Secretary.

N. B.—The town or other clerk should charge a remunerative fee for replying to the above circular, and present to the town council or board of health, it being a service required by law.

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*If not known by the person replying, please state where or of whom such information may be obtained.

BRISTOL COUNTY.

BARRINGTON.

1. Nothing for the promotion of the public health has been done during the year.

2. There has been no change during the year in the number of the town people who have availed themselves of the water supplied by a private company.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. Effort has been put forth by the health officer to secure a better enforcement of those already in existence. (See contagious disease ordinance, report of 1897, p. 10.)

5. This town has no legal board of health other than the town council.

6. Charles H. Bowden, health officer.

7. Gratuitous vaccination has not been provided in this town during the year.

8. Early in the year the undertakers were slow in making returns of death. Later they were more prompt.

9. Clergymen make returns of marriages as soon as the ceremony is performed.

FREDERICK P. CHURCH, *Town Clerk.*

BRISTOL.

1. Nothing for the promotion of the public health has been done during the year.

2. About two-thirds of the population was supplied from the water service of this town at the end of the year.

6. George H. Peck, health officer.

7. Gratuitous vaccination for about fifty persons was provided during the year.

8. Undertakers have promptly made returns of deaths.

9. Clergymen make returns of marriages promptly.

HERBERT F. BENNETT, *Town Clerk.*

WARREN.

1. Nothing special for the promotion of the public health has been done during the year.

2. The water service of this town is about the same as that of last year.

3. There is no public sewage system in this town. The private sewers have been extended in some streets.

4. No new sanitary ordinances have been adopted during the year.

5. This town has no legal board of health other than the town council.

6. Abram Bowen, health officer.

7. Gratuitous vaccination has not been provided in this town during the year.

8. Undertakers have generally been prompt in making their returns of deaths.

9. Clergymen make returns of marriages promptly.

CHARLES B. MASON, *Town Clerk.*

KENT COUNTY.

COVENTRY.

1. Private enterprise has been responsible for the better care of cesspool and privy vaults.

2. A slight extension of the water service of this town has been made during the year.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year.

6. John Winsor, M. D., health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers are generally prompt in making their returns of deaths.

9. Clergymen make their returns of marriages promptly.

STEPHEN W. GRIFFIN, *Town Clerk.*

EAST GREENWICH.

1. Nothing for the promotion of the public health has been done during the year.

2. There are five hundred twenty-five water taps in this town. Fully sixty-four per cent. of the population is supplied by the same.

3. The aggregate length of sewers in this town is six thousand, three hundred thirty-five feet. Drainage is furnished to one hundred twenty-five estates, of which seventy-five per cent. have made connection. Six hundred to seven hundred people are directly affected.

4. No new sanitary ordinances have been enacted during the year. (Health ordinance, see report of 1894, p. 27.)

5. This town has no legal board of health other than the town council.

6. Elbridge G. Carpenter, M. D., health officer.

7. No mention has been made of vaccination during the year, gratuitous or otherwise.

8. Undertakers have made their returns of deaths promptly.

9. Clergymen are prompt in making returns of marriages.

GEORGE A. LOOMIS, *Town Clerk.*

WEST GREENWICH.

1. Nothing for the promotion of the public health has been done during the year.

3. This town has no sewage system.

5. This town has no legal board of health other than the town council.

7. Gratuitous vaccination was not provided during the year.

8. Undertakers make their returns of deaths promptly.

9. There are no clergymen in this town.

WILLIAM N. SWEET, *Town Clerk.*

WARWICK.

1. To the best of my knowledge, nothing for the promotion of the public health has been done during the year.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. (Contagious disease ordinance, see report of 1893, p. 45.)

5. This town has no legal board of health other than the town council.

6. Albert G. Sprague, M. D., health officer.

8. Undertakers are reasonably prompt in making returns of deaths.

9. Clergymen are prompt in making returns of marriages.

JAMES T. LOCKWOOD, *Town Clerk.*

NEWPORT COUNTY.

JAMESTOWN.

1. Nothing for the promotion of the public health has been done during the year.

2. About two-thirds of the population is supplied by the water supply of this town.

3. The aggregate length of sewers in this town is about four and one-quarter miles, and about two-thirds of the population are connected therewith.

4. No new sanitary ordinances have been enacted during the year. (Health laws, see report of 1893, p. 46, and 1894, p. 29.)

The following ordinance was passed by the town council at its regular monthly meeting, held December 26th, 1898:

Voted, That all physicians doing business in this town be and they are hereby required to report all cases of contagious diseases to the town clerk or health officer of this town.

A true copy,

Attest:

WM. F. CASWELL,

Town Clerk.

5. This town has no legal board of health other than the town council.

6. Abbott Chandler, health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have promptly made returns of deaths.

9. Clergymen make returns of marriages promptly.

WM. F. CASWELL, *Town Clerk.*

LITTLE COMPTON.

1. Nothing for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

REGULATIONS FOR THE PREVENTION OF INFECTIOUS AND CONTAGIOUS DISEASES.

Be it enacted by the Town Council of the town of Little Compton as follows, viz.:

SECTION 1. Every physician having knowledge of the existence, in the town of Little Compton, of any case of Asiatic cholera, typhus fever, typhoid fever, diphtheria, scarlet fever, measles, or such other contagious or infectious diseases as the health officer may from time to time designate, shall make report in writing thereof to the health officer within twenty-four hours after such knowledge, and said health officer shall forthwith take necessary precautions to prevent the spread thereof.

SEC. 2. Any physician who shall neglect or refuse to comply with the preceding regulation shall be fined not less than five dollars nor more than ten dollars for each day of such neglect, after having knowledge of the existence of any disease therein mentioned, or any other disease concerning which reports may be required by the health officer. The physician having received notice of the adoption of these rules.

SEC. 3. Every householder in the town of Little Compton, in whose house any person is sick with any aforesaid diseases, or other malignant or contagious disease, shall report the same to the health officer within seventy-two hours.

SEC. 4. Every householder who shall neglect or refuse to comply with the preceding regulation shall be fined not less than two dollars, nor more than ten dollars, for each day of such neglect or refusal.

SEC. 5. Whenever the health officer is notified that there exists in the town of Little Compton any case of malignant or contagious disease, he shall have authority to visit the premises where such disease is supposed or suspected to exist and to investigate the matter of such existence, and to take proper precautions to prevent the spread of such disease; and he may, if necessary, call upon the town sergeant for assistance in making such investigation or in enforcing the observance of such precautions as may be deemed advisable.

SEC. 6. Whenever the health officer shall have completed his investigation regarding any contagious or infectious disease in this town, he shall report in writing to the town council, certifying to the facts, under oath, over his own signature.

SEC. 7. A copy of such report, duly certified and sworn to, shall be the official report in such matters and as such shall be submitted to the State Board of Health, and if approved by said authorities, the town council may print and circulate the same at their discretion.

A true copy,

Attest: F. R. BROWNELL, *Town Clerk.*

5. This town has no legal board of health other than the town council.

6. Adam S. MacKnight, M. D., health officer.

7. Gratuitous vaccination has not been provided during the year.

9. Clergymen are generally prompt in making their returns of marriages.

FREDERICK R. BROWNELL, *Town Clerk.*

MIDDLETOWN.

1. No particular work was undertaken or done during the year.

2. There was no introduction or extension of the water service.

3. This town has never had any system of sewage.

4. No new sanitary ordinances were adopted during the year. Active measures were taken to bring to punishment offenders against ordinances formerly adopted to preserve good sanitary conditions. (Contagious disease ordinances, see report of 1893, p. 48.)

5. This town has no legal board of health other than the town council.

6. George E. Ward, health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have generally been very punctual in making returns of deaths.

9. Clergymen make returns of marriages promptly.

ALBERT L. CHASE, *Town Clerk.*

NEWPORT.

No reply from the city clerk.

NEW SHOREHAM.

1. Nothing special for the promotion of the public health but the usual routine work and enforcement of ordinances previously enacted was done during the year.

2. There is no public water service in this town.
3. This town has no sewage system.
4. No new sanitary ordinances have been enacted during the year.
5. This town has no legal board of health other than the town council.
6. Hamilton A. Mott, health officer.
7. Very few, if any, were vaccinated during the year.
8. Undertakers have promptly made returns of deaths.
9. Clergymen make returns of marriages promptly.

EDWARD P. CHAMPLIN, *Town Clerk.*

PORTSMOUTH.

1. Nothing in particular for the promotion of the public health has been done during the year.

2. This town has no water supply for general use, although the Newport Water Works has a reservoir in the southern part of the town. The water from the same flows through the main pipe direct into Newport. In one instance the water company supplied a private residence in this town, as in constructing the reservoir they interfered with the water rights of the owner of said residence, therefore, in return, conducted to the residence through pipe especially laid.

3. This town has no sewage system.
4. No new sanitary ordinances have been enacted during the year.
5. This town has no legal board of health other than the town council.
6. Minot A. Steele, M. D., health officer.
7. Gratuitous vaccination has not been provided during the year.
8. Undertakers have promptly made their returns of deaths.
9. Clergymen make returns of marriages promptly.

PHILIP B. CHASE, *Town Clerk.*

TIVERTON.

1. Nothing for the promotion of the public health has been done during the year.
2. This town has no public water service.
3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. (Contagious disease ordinance, see report of 1897, p. 17.)

5. This town has no legal board of health other than the town council.

6. Edward P. Stimson, M. D., health officer.

8. Undertakers have promptly made their returns of deaths.

9. Clergymen make returns of marriages promptly.

A. LINCOLN HAMBLY, *Town Clerk.*

PROVIDENCE COUNTY.

BURRILLVILLE.

1. Nothing for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. All existing ordinances have been well enforced, as far as is known. (Contagious disease ordinances, see report of 1897, p. 20.)

5. This town has no legal board of health other than the town council.

6. Andrew Higgins, health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have been commendably prompt in making their returns of deaths.

9. Most of the clergymen make returns of marriages promptly; some have to be reminded occasionally.

EDGAR A. MATHEWSON, *Town Clerk.*

CENTRAL FALLS.

No reply from the city clerk.

CRANSTON.

1. Nothing for the promotion of the public health has been done during the year.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. All existing ordinances have been well enforced.

6. Dan O. King, M. D., and John Bigbee, health officers.

7. Three hundred children were gratuitously vaccinated during the year.

8. Undertakers have promptly made returns of deaths.

9. Clergymen make returns of marriages promptly.

DANIEL D. WATERMAN, *Town Clerk.*

CUMBERLAND.

1. Nothing for the promotion of the public health has been done during the year.

2. There has been no extension of the water service of this town during the year.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. (Contagious disease ordinance, see report of 1893, p. 53.)

5. This town has no legal board of health other than the town council.

6. Bernard F. McDermott, M. D., health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have promptly made returns of deaths.

9. Clergymen make returns of marriages promptly.

JOHN F. CLARK, *Town Clerk.*

EAST PROVIDENCE.

4. (Contagious disease and garbage ordinances, see report of 1893, p. 54.)

FOSTER.

6. Henry Arnold, M. D., health officer.

7. To the best of my knowledge, gratuitous vaccination was not provided during the year.

8. Undertakers are not always prompt in making returns of deaths.

9. Clergymen are more prompt than formerly in making returns of marriages.

EMORY D. LYON, *Town Clerk.*

GLOCESTER.

1. Nothing for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

5. This town has no legal board of health other than the town council.

6. George A. Harris, M. D., health officer.

7. Gratuitous vaccination was provided during the year, and one hundred and sixty-three persons were so vaccinated.

8. Undertakers have promptly made returns of deaths.

9. Clergymen make returns of marriages promptly.

CHARLES W. FARNUM, *Town Clerk.*

JOHNSTON.

1. Since June 1, 1898, nothing for the promotion of the public health has been done. Prior records of the town are now in the possession of the city of Providence.

2. There has been no extension of the water service of this town since June 1, 1898.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted since June 1, 1898. All previous ordinances have been well enforced. (Contagious disease and nuisance ordinances, see report of 1896, p. 20.)

5. Ralph H. Shaw, M. D., Austin H. Longfellow, M. D., and William P. Brownell constitute the board of health of this town.

6. Charles A. Barnard, M. D., health officer.

7. Since June 1, 1898, sixty-four children have received gratuitous vaccination, according to the records.

8. Undertakers have promptly made returns of deaths.

9. Clergymen make returns of marriages promptly.

STERRY K. LUTHER, *Town Clerk.*

LINCOLN.

4. (Contagious disease ordinance, see report of 1896, p. 25.)

NORTH PROVIDENCE.

1. To the best of my knowledge, nothing for the promotion of the public health has been done during the year.

2. There has been no extension of the water service of this town during the year.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. All previous ordinances have been well enforced.

5. This town has no legal board of health other than the town council.

6. Sanford E. Kinnecom, health officer.

7. Gratuitous vaccination has not been provided during the year,

8. Undertakers have made returns of deaths as promptly as could be expected.

9. Clergymen make returns of marriages promptly.

THOMAS H. ANGELL, *Town Clerk.*

NORTH SMITHFIELD.

1. Nothing special for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year.

5. This town has no legal board of health other than the town council.

6. Remington P. Capwell, M. D., health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers are rather slow in making returns of deaths.

9. Clergymen make returns of marriages promptly.

CHARLES S. SEAGRAVE, *Town Clerk.*

PAWTUCKET.

RULES RELATIVE TO THE REMOVAL AND DISPOSAL OF NIGHT-SOIL AND THE CONTENTS OF CESS-POOLS.

1. No person shall engage in the business of removing the contents of privy vaults and cess-pools, or shall remove the contents of privy vaults or cess-pools, without first obtaining a license of the board of aldermen; but nothing in this section shall be construed as forbidding any person the

owner of a privy vault or of a cess-pool from removing the contents therefrom provided a permit be first obtained from the city physician.

2. Every licensee must be provided with a pneumatic or odorles apparatus. All tanks, tank wagons, tubs, or barrels must be kept air-tight and free from leakage, and all apparatus used in the business must be kept clean and well-painted, and must have the name of the licensee upon it in plain letters, and must be approved by the city physician.

3. No wagons, tanks, tubs, or other apparatus referred to in section 2 shall be allowed to stand in the street except while in use.

4. All privy vaults and cess-pools must be cleaned by the odorless process, except by permission of the city physician.

5. No privy vault or cess-pool shall be cleaned between the hours of sunset and sunrise, except as directed by the city physician.

6. No person shall deposit within the city the contents of any privy vault or of any cess-pool without permission of the city physician.

7. No licensee shall charge more than five cents per cubic foot for removing the contents of privy vaults or of cess-pools; provided, however, that if there be only one load of less than sixty cubic feet from any one estate it may be charged for as if it were a full load of sixty cubic feet.

8. When any privy vault or any cess-pool is cleaned, the entire contents thereof shall be removed.

9. The city clerk shall issue the licenses when granted by the board of aldermen, the annual fee for which shall be the sum of five dollars, and all licenses shall expire on the 31st day of January in each year. These rules shall be printed on the back of the license issued to each licensee, and the license shall be subject to revocation whenever, in the opinion of the city physician, the apparatus is not proper for the work to be performed in a suitable manner.

10. All rules or parts of rules inconsistent herewith are hereby repealed.

11. These rules shall take effect on and after February 1st, 1899.

The following ordinances were passed during the year:

CHAPTER 110.

Passed May 19, 1898.

AN ORDINANCE RELATING TO THE REGISTRATION OF DEATHS.

It is ordained by the City Council of the City of Pawtucket as follows:

SECTION 1. There shall be appointed as soon as may be after the passage of this ordinance, and annually in the month of February thereafter, by the board of aldermen, a sufficient number of persons to act as under-

takers, removable at any time by said board of aldermen for cause satisfactory to them.

SEC. 2. Whenever any person shall die in the city, the physician attending in his or her last sickness shall furnish to the undertaker attending the funeral, or to the city clerk, a certificate giving the name of the person, date of death, and the disease or cause of his or her death.

SEC. 3. No person shall bury or place in a tomb or remove from the city or otherwise dispose of the body of any human being who shall die in the city without first reporting the death to the city clerk and obtaining a permit from him.

SEC. 4. No permit shall be given, as provided in section three, until the city clerk is furnished with the information in relation to the deceased person required by the laws of the state for record, so far as the same can be ascertained, together with the physician's certificate of the cause of death, whenever a physician has been in attendance; provided, however, that whenever the body of a person is lying dead in the city who has been unattended by a physician in his or her last sickness, the city clerk shall call upon a registered physician or the medical examiner of the district to inquire into and to certify as to the cause and manner of death, and shall allow to said physician or medical examiner the fee of two dollars, which shall be paid out of the city treasury upon the order of the city clerk; and provided further, that whenever the medical examiner is called and finds, upon inquiry, that the case is within the provisions of chapter 287 of the general laws, his services shall be rendered and fees paid in accordance with the provisions of said chapter 287.

SEC. 5. Whenever the body of a human being who has died out of the city shall be brought here for burial, the undertaker or other person attending the funeral shall furnish the report required in section three and four, with the exception of the physician's certificate.

SEC. 6. No undertaker or other person shall bury or cause to be buried the body of any deceased person in the city except in such grounds as are or may be designated as burying grounds and authorized to be used as such.

SEC. 7. Every person violating any of the foregoing provisions of this chapter shall pay a fine of not less than five nor more than twenty dollars for each offence.

SEC. 8. The city clerk shall cause the above ordinance to be published in all the newspapers published in the city in three successive issues of each paper, and shall cause a printed copy of said ordinance to be mailed to each registered physician and undertaker in this city, and to such other

physicians and undertakers in nearby towns and cities as he shall deem necessary, and this ordinance shall take effect on and from ten days after its passage.

The following extracts are taken from the report of the Board of Public Works :

Summary of Pumping at Nos. 1, 2, and 3 Stations for the Year Ending September 30, 1898.

Total expenses for the year	$15,332 90
Total number of U. S. gallons pumped into reservoir	2,060,982,260
Total cost of raising 1,000,000 gallons into reservoir	$7.43
Total cost of raising 1,000,000 gallons one foot high	$0.0278
Average daily consumption of water in U. S. gallons	5,646,526
Maximum daily consumption of water in U. S. gallons	8,609,688
Minimum daily consumption of water in U. S. gallons	2,955,815

Respectfully submitted,

JOHN H. WALKER, *Chief Engineer.*

Table Showing Amount of Rain and Melted Snow, in Inches, for the Year Ending September 30, 1898.

Days of Month.	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	Days of Month.
1	.....	.....	†0.03	.....	†2.41	.....	.....	.....	0.01	.....	.....	0.04	1
2	.....	2.69	.....	.....	.....	.....	0.15	.....	*	.....	.....	.....	2
3	.....	.....	†0.04	*†	.....	†0.17	*†	0.06	.....	.....	.....	0.28	3
4	.....	.....	.....	.....	.....	.....	.....	0 07	.....	1.03	0.34	.....	4
5	.....	0.02	0.39	†0.22	*†	†0.75	.....	.....	0.37	.....	1.86	.....	5
6	.....	.....	.....	.....	0.19	.....	†0.42	0.47	.....	.....	.....	.....	6
7	.....	.....	.....	0.28	.....	.....	*†	*	.....	.....	.....	0.19	7
8	.....	.....	‡0.22	.....	.....	.....	.....	‡0.37	.....	.....	*	.....	8
9	.....	0.72	.....	.....	.....	.....	.....	.....	*	0.10	*	.....	9
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
11	0.01	.....	0.02	.....	.....	.....	0.27	*	*	.....	2.94	.....	11
12	0.28	‡1.45	0.56	0.06	0.11	0.07	.....	.....	*	.....	.....	.....	12
13	.....	.....	.....	*	.....	*	*	*	.....	4.16	0.76	.....	13
14	.....	.....	.....	.....	*†	.....	*	.....	0.40	.....	.....	.....	14
15	.....	.....	2.68	‡0.42	*	.....	.....	.....	.....	.....	.....	.....	15
16	.....	.....	.....	.....	0.04	*	0.25	.....	.....	.....	.....	0.02	16
17	.....	0.34	0.01	.....	.....	0.05	.....	0.76	.....	.....	0.12	0.15	17
18	.....	.....	.....	.....	*	.....	*	.....	.....	.....	.....	*	18
19	.....	.....	.....	.....	.....	0.48	.....	.....	*	0.63	0.22	.....	19
20	.....	†0.22	.....	‡1.27	.....	.....	0.38	0.10	.....	.....	.....	.....	20
21	0.19	.....	‡0.40	.....	.....	.....	*	.....	0.33	1.65	.....	.....	21
22	.....	.....	†0.01	.....	3.70	.....	.....	.....	.....	.....	.....	.....	22
23	.....	†0.37	.....	‡1.01	0.08	0.35	.....	.....	.....	.....	0.39	1.66	23
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	*	*	*	24
25	0.13	*	.....	.....	.....	.....	.....	1.21	.....	.....	.....	.....	25
26	.....	.....	‡0.39	†0.63	.....	.....	3.42	.....	.....	0.02	.....	0.07	26
27	.....	0.53	.....	.....	.....	.....	.....	0.80	.....	*	.....	.....	27
28	*	.....	.....	.....	.....	.....	.....	.....	*	0.16	.....	.....	28
29	0.04	0.18	.....	.....	.....	.....	0.75	.....	.....	.....	.....	.....	29
30	.....	.....	‡0.14	.....	.....	.....	.....	*	.....	*	.....	.....	30
31	.....	.....	‡0.23	.....	.....	‡0.86	.....	0.09	.....	1.54	.....	.....	31
	0.65	6.52	5.12	3.89	6.58	2.73	5.64	3.93	1.11	9.29	6.63	2.41	

Total rain and melted snow, 54.45.

Total depth of snow, inches, 55.

* Too small to measure.

† Snow.

‡ Snow and rain.

FILTER FIELDS.

This plant, located in the southern part of the city on the bank of the Moshassuck river, and utilized for the disposal of the sewage of the Moshassuck river district, has continued to do good work during the year.

In the latter part of November and the first of December the beds were prepared for winter work by going over all the area carefully and removing all dirty sand that had accumulated on the surface, and then furrowing all the beds excepting 12 and 13. About 446 cubic yards of poor sand were

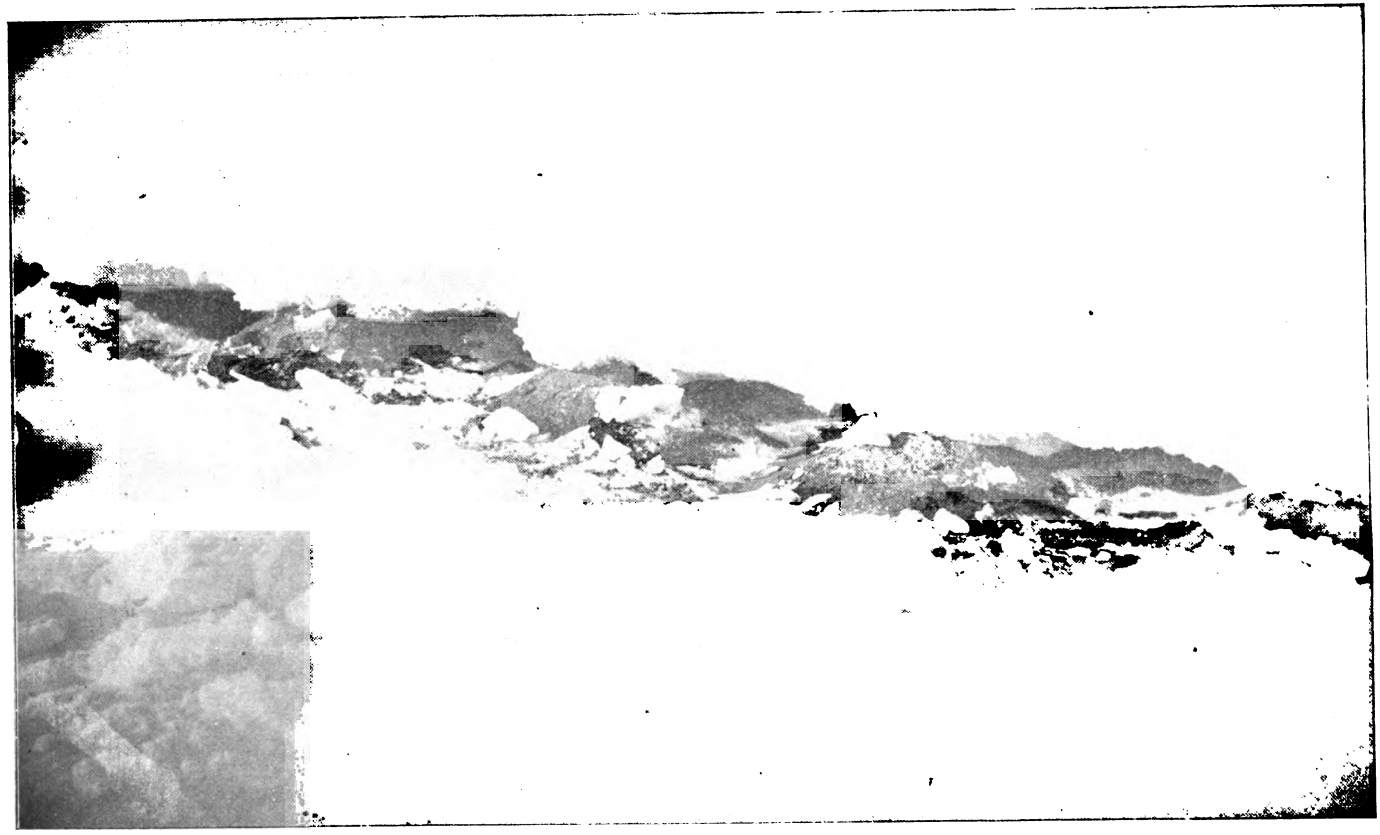


FIG. 1.—SEWAGE FILTER FIELDS AT PAWTUCKET, R. I.
Showing condition of furrowed beds after a heavy fall of snow.

removed in this work, or an average of 190.3 cubic yards per acre. 23,700 lineal feet of ditch were cut in furrowing the beds.

In July rather more extensive work than usual was done. From beds 1-2-3-4-6-12 and 13 all the poor sand, amounting to 103 cubic yards, was again removed from the surface preparatory to leveling up sludge beds 1-2-3 and 4, and adding to the area of the beds devoted to this work by making use of bed 6 for the same purpose.

As it was necessary to lower the level of bed 6 before it could be used as a sludge bed, the sand taken from this bed was used to raise the level of beds 1-2-3 and 4. About 265 cubic yards of good sand were taken from 6 and spread over the other four beds.

On account of the amount of sludge that was regularly turned on beds 1-2-3 and 4, the level of the ground water in these beds remained very high, and it was deemed best to lay underdrains. Up to the present time the only underdrain which had been provided for these four beds was laid along the north side of bed 4, and all the sewage which found its way into it from beds 1-2 and 3 had to pass through the sand of bed 4 and through that of all the other beds that lay between the bed from which the sewage came and bed 4.

In the construction of the plant it was thought that it might be advisable in the future to provide more underdrains for these beds, and it was felt that that time had arrived. An underdrain was accordingly laid across the west end of beds 1 and 2 and up the north side of bed 2 next to bed 3. Since these underdrains were laid the level of the water in these beds has been lowered.

Nothing has been done to beds 5-7-8-9-10 and 11 since they were furrowed in December, except to rake the surface after every fifth dose of sewage. The furrows were not leveled during the summer, and no work upon these beds will probably be necessary to prepare them for winter work, as they appear to be in very good condition.

In the case of beds which receive sludge, it is easier to gather the deposit which remains on the surface after the liquid portion of the sewage has passed down into the sand from a level surface than from furrows, and so these beds were leveled for summer work, but they will be furrowed again in November, as it has been observed that, while furrowing is an advantage to all beds, its effect on sludge beds is particularly marked.

The accompanying illustrations, made from photographs taken at the filter fields on February 4, 1898, after a heavy fall of snow, show very clearly the practical effect of furrowing the beds.

About eleven inches of snow fell on January 31st and February 1st,

1898, and the first dose of sewage applied to this bed after the storm was on February 3d. On February 4th the snow was broken away, and the photograph, reproduced as Fig. 1, was taken just before the application of the second dose of sewage to this bed.

The view illustrated by Fig. 2 was made directly after the first one, as the second dose of sewage was running out upon the bed.

The following table shows the number of gallons of sewage received and treated at the plant during the year:

	Gallons of sewage.	Av. galls. per day.
October, 1897	2,092,220	67,490
November, 1897	1,694,560	56,485
December, 1897	2,232,240	72,008
January, 1898	2,581,480	83,274
February, 1898	1,626,300	58,082
March, 1898	2,025,540	65,340
April, 1898	1,527,580	50,919
May, 1898	1,927,920	62,191
June, 1898	1,871,144	62,371
July, 1898	1,770,640	57,117
August, 1898	1,480,200	47,748
September, 1898	3,017,920	100,597
Total	23,847,724	

The average number of gallons per day has been 65,336.

The following table is of interest as showing the total amount of work done by the different beds from the time the plant was put in regular operation up to October 1, 1898:

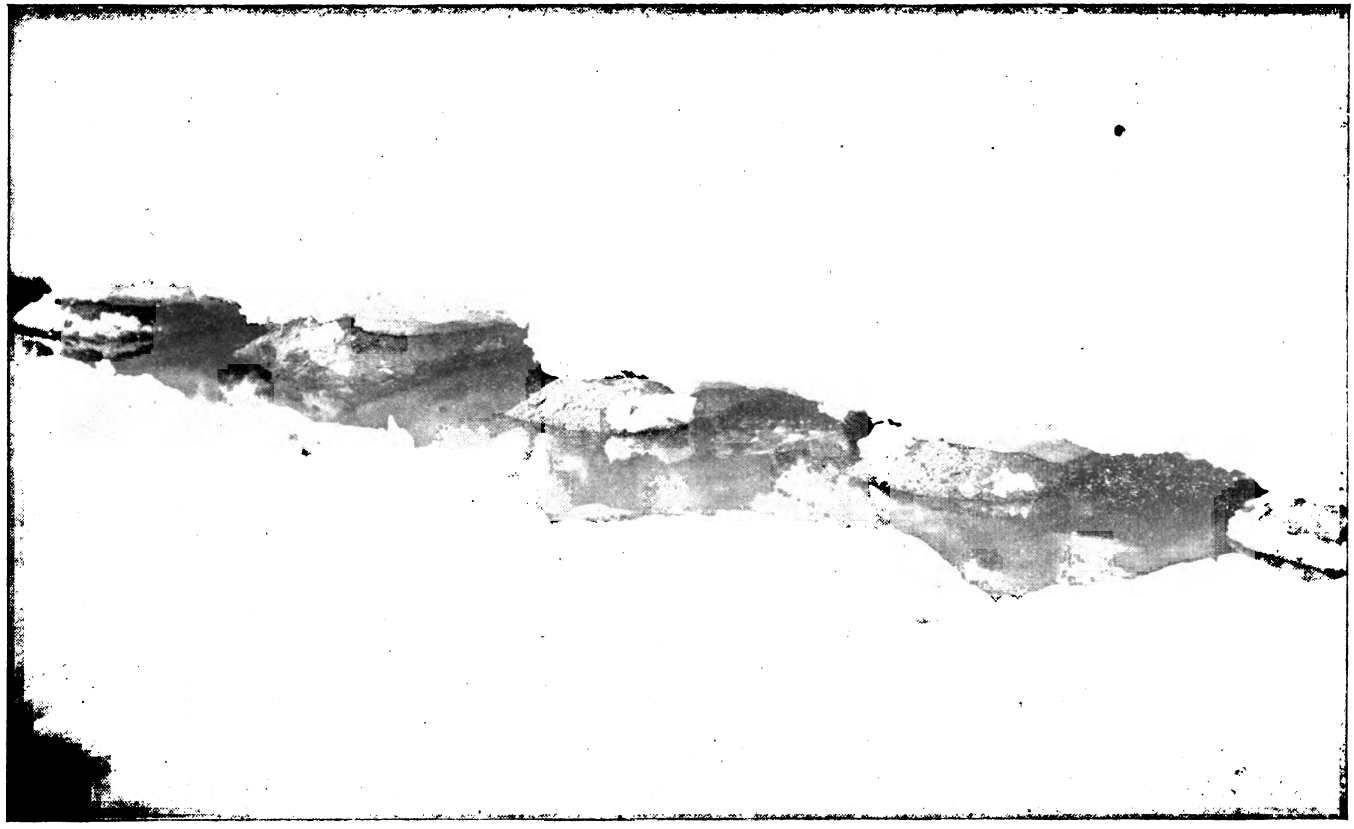


FIG. 2.—SEWAGE FILTER FIELDS AT PAWTUCKET, R. I.

Showing the flow of sewage on furrowed beds, under snow arches formed after a heavy fall of snow.

Table Showing Working of Beds from Dec. 1st, 1894, to Oct. 1st, 1898.

Number of Bed.	Cubic yards of poor sand removed from Dec. 1st, 1894, to Oct. 1st, 1898.	Cubic yards of sludge removed from Dec. 1st, 1894, to Oct. 1st, 1898.	Average depth in inches of poor sand removed from Dec. 1st, 1894, to Oct. 1st, 1898.	Total number of gallons of sewage let on.	Cubic yards of poor sand removed for each 1,000,000 gallons of sewage.
1	45	65.64	2 5/8	3,718,902	12.10
2	50	66.47	2 3/4	3,926,650	12.73
3	42	64.27	2 5/8	2,950,431	14.24
4	41	64.57	2 1/2	2,672,114	15.34
5	43	.....	1 1/8	11,787,255	3.65
6	84	3.06	3	8,308,914	10.11
7	63	.....	2 5/8	7,171,090	8.79
8	53	.....	2 1/8	7,224,498	7.34
9	46	.....	1 7/8	7,899,266	5.82
10	68	.....	2 3/8	7,758,235	8.76
11	49	.....	2	7,772,825	6.30
12	48	.....	1 3/4	5,905,682	8.13
13	46	.....	1 5/8	5,921,012	7.77
	678	264.01	.....	83,016,874	Average, 8.17

Began using beds 1-2-5-6-7 regularly on Dec. 1st, 1894.
" " " 8-9-10-11 " Jan. 1st, 1895.
" " " 3-4 " Aug. 1st, 1895.
" " " 12-13 " Nov. 1st, 1895.

Average number of cubic yards of poor sand removed per acre of filtering area, 289.38.
" depth in inches " " " " 2 1/8
" number of cubic yards of sludge removed per 1,000,000 gallons of sewage, 3.18.

The application of sewage upon the beds has been the same as last year, 80,000 gallons per acre for the sludge beds and 100,000 gallons per acre for the others.

The following table represents the percentage of purification obtained as shown by the samples of sewage and effluent which are taken monthly at this plant. These samples are taken about the first of each month, under as nearly average conditions as possible, and are assumed to represent the average work of the plant for the month just previous to the time that they are taken.

It will be noticed that but ten months are represented, as samples were not taken in January and June.

The total nitrogen is figured, as formerly, as fourteen-seventeenths of the sum of the free ammonia and double the albuminoid ammonia.

Month.	Dose in gallons per acre.	Average number of days between doses on beds on which samples were taken.	Bed on which sewage was applied when samples were taken.	ANALYSIS OF SAMPLES. PARTS PER 100,000.														Per cent. of unoxidized nitrogen removed from sewage.	Per cent. of organic matter removed as shown by albuminoid ammonia.	Average per Month.		Total rain-fall in inches.
				Free Ammonia.		Albuminoid Ammonia.				Nitrogen as Nitrates.		Nitrogen as Nitrates.		Total Nitrogen.		Chlorine.		Oxygen Absorbed in 4 Hours.				Temperature of sewage.	Temperature of air.	
						Total.		Suspended.																
				Sewage.	Effluent.	Sewage.	Effluent.	Sewage.	Effluent.	Sewage.	Effluent.	Sewage.	Effluent.	Sewage.	Effluent.	Sewage.	Effluent.	Sewage.	Effluent.					
October	100,000	3.54	7-8-9-1	8.512	0.25	4.00	0.035	2.75	0.007	0.00	4.14	0.09	0.007	13.59	0.264	8.00	8.00	18.80	0.16	98.0	99.1	56.42	.....	0.515
November	100,000	4.29	5-6-7-8	8.0	0.60	1.40	0.04	0.90	0.01	0.00	2.82	0.00	Trace	5.89	0.55	7.00	6.20	7.80	0.32	93.7	97.1	49.41	35.65	6.41
December	100,000	3.26	8-9-10-1	4.0	1.00	3.20	0.024	1.80	0.004	0.00	1.82	0.00	0.03	8.56	0.86	6.00	7.00	9.44	0.32	90.0	99.3	43.28	33.98	4.735
January	100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	41.51	29.18	4.050
February	100,000	5.33	11-12-3	4.2	1.00	1.00	0.03	0.80	0.005	0.00	1.25	0.00	0.02	5.11	0.873	6.60	5.20	5.28	0.32	83.0	97.0	43.10	32.32	7.28
March	100,000	3.44	6-7-8-2	6.4	0.64	3.20	0.045	1.80	0.025	0.00	2.80	0.00	0.01	10.54	0.601	7.30	7.40	9.08	0.34	94.3	98.6	42.44	44.06	3.225
April	100,000	6.00	9-10-3	10.0	0.50	2.40	0.04	1.10	0.02	0.00	3.13	0.00	Trace	12.19	0.478	9.80	6.50	10.4	0.32	96.1	98.3	43.92	45.93	6.035
May	100,000	5.17	10-11-1	8.80	0.64	3.20	0.035	1.60	0.015	0.00	5.77	0.00	0.025	12.52	0.585	8.80	6.20	7.32	0.28	95.4	98.9	48.77	59.06	3.92
June	100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.94	.....	1.64
July	100,000	3.35	8-9-10-1	5.3	0.50	2.58	0.028	0.98	0.011	0.00	3.16	0.00	0.03	8.61	0.458	7.20	6.50	4.61	0.40	94.7	98.9	60.06	.....	7.52
August	100,000	4.77	10-11-12-2	7.16	0.16	2.60	0.03	1.50	0.01	0.00	4.40	0.00	0.03	10.18	0.181	6.60	7.80	6.51	0.12	98.2	98.8	65.81	72.63	9.12
September	100,000	2.1	7-8-9-1	8.0	0.24	1.80	0.025	0.85	0.005	0.00	3.51	0.00	0.00	9.55	0.289	6.80	6.00	7.60	0.24	97.5	98.6	64.48	65.96	2.31
Average	.....	.....	.....	7.037	0.55	2.538	0.033	1.358	0.011	0.00	3.28	0.00	0.015	9.97	0.507	7.41	6.75	8.681	0.28	94.1	98.5	.....	.....	.....

Total precipitation—56.82 inches.

PLATE II.

SCHEDULE.

Area of the city	8.725	square miles.
" " " first ward	2.649	" "
" " " second ward	2.740	" "
" " " third ward	0.483	" "
" " " fourth ward	1.060	" "
" " " fifth ward	1,793	" "
Approximate length of accepted streets	75.00	miles.
" " " platted streets	55.73	"
Total length of streets	130.73	"
Approximate amount of curbing set	68.21	"
Approximate length of curbed streets	38.47	"
Streets paved with granite blocks, 97,155 square yards or	5.73	"
" " " brick paving, 1,965 " "	0.14	"
" " " asphalt paving, 919 " "	0.06	"
" " " concrete " 1,657 " "	0.12	"
Length of macadamized streets	14.77	"
Length of gravelled streets	57.80	"
Total length of improved streets	78.62	"
Total length of water mains connected with the Pawtucket water works	141.50	"

Capacity of pumping engines 12,000,000 gallons per 24 hours.

Water pressure in Main street square 110 lbs. per square inch.

Total length of sewers	42.08	miles.
Total length of electric railways	23.52	"

PROVIDENCE.

1. A large amount of work has been contemplated and executed in the various departments of the city during the year.

2. Extract from report of city engineer :—

The number of meters in use is 16,388.

The number of service pipes in use is 20,473.

The average daily use of water per service for the year 1898 has been 447 gallons.

The population of the city is estimated at 162,000, and the population supplied in the suburbs is estimated at 8,200.

The water receipts for 1898 were $502,603.10.

The net cost of maintenance for 1898 was $60,956.70.

The net cost of the water-works construction from November 8, 1869, to January 1, 1899, is $6,417,699.33, upon which there has been a revenue for water sold of $8,356,089.89.

The monthly and annual and the average daily and monthly consumption of water in gallons, including waste and leakage, during the year, is shown by the following table :

Months.	Consumption per month.	Average monthly consumption.	Average daily consumption per month.	Average daily consumption for the year.
January	265,280,964		8,557,450	
February	254,506,545		9,089,519	
March	269,167,942		8,682,837	
April	251,253,805		8,375,127	
May	258,855,139		8,350,166	
June	301,195,459		10,039,849	
July	313,081,884		10,097,801	
August	292,514,548		9,435,953	
September	295,124,217		9,837,474	
October	277,072,068		8,937,809	
November	262,511,174		8,750,372	
December	298,868,891		9,640,932	
Total	3,339,382,586	278,281,882		9,148,998

The records relating to meteorological observations have been kept by this department.

Plate No. II shows a method that has been practiced successfully during the past year, of melting out with a "Wells light" the lead joints of a line of twenty-four inch cast iron water pipe, which it was necessary to remove temporarily from its original location. A No. 3 "Wells light" was used that burned kerosene oil under a compressed air pressure of from twenty-three to twenty-five pounds per square inch. Each joint was melted out in about one hour with a consumption of about two gallons of oil. Plate No. III shows the sheet iron hood, which was used to aid in concentrating the heat, moved back in order to obtain a better view, and the burner turned to one side for the purpose of exposing the flame. At times, when

PLATE III.

there was too much wind, a circular strip of sheet iron, in two parts, was placed in front of the hood.

Plate No. IV is an interior view of the bell end of an originally "tar coated" twenty-four inch cast iron water pipe, showing tuberculation due to corrosion. The pipe had been in service about twenty-five years, and was one of a line of twenty-seven pipes that were temporarily removed from their original location during the past year. The interior of the pipe was a fair example of the average condition of the interiors of the other twenty-six pipes. The photograph was taken at the city pipe yard, about a mile from where it was taken up, where it had been taken for the purpose of cleaning, and, although the transportation was done carefully, a small number of the tubercles were jarred off from the pipe. There was no appreciable difference, however, in the appearance of the interior of the pipe from what it was before it was removed from its oriainal location.

Following will be found a table giving a summary of water works statistics prepared in accordance with suggestions adopted by the New England Water Works Association:

SUMMARY OF STATISTICS.—REPORT OF 1898.

In accordance with suggestions adopted by the New England Water Works Association. Providence Water Works, Providence County, R. I.

Population of Providence.....162,000
Estimated population supplied in suburbs..... 8,200
Date of construction.....1870 to 1876.
By whom owned .....City of Providence.
Source of supply .....Pawtuxet river, in the town of Cranston.
Mode of supply:

The water is pumped from the Pawtuxet river into a storage reservoir located upon a hill about one mile distant. From this reservoir it flows into the city by gravitation, directly supplying a second storage reservoir within the city limits, and also that portion of the city which is of sufficiently low elevation to be served by gravitation. To supply that part of the city of too high an elevation to be served by these reservoirs, a third reservoir is located in the town of North Providence. The water is pumped by supplementary pumping machinery from the second reservoir above mentioned or from the mains, into the high service reservoir. This supplementary pumping machinery can also supply the high service district, if the reservoir should be out of service, by pumping directly into the mains.

In addition to the regular distribution pipes there is an independent high pressure fire system (deriving its supply from the high service) for protecting an area of about one-half of one square mile in the centre of the business portion of the city.

PUMPING.

1. Builders of pumping machinery:

a. Worthington Duplex engine, built by Henry R. Worthington.

b. Cornish engine, built by Paulding, Kemble & Co.

c. Corliss Vertical engine, built by George H. Corliss.

d. Worthington Triple Expansion engine, built by Henry R. Worthington.

e. Nagle High Service engine, built by the Providence Steam Engine Co.

f. Holly High Service engine, built by the Holly Manufacturing Co.

	Worthington Triple Expansion.	Holly High Service.
2.	Description of coal used,	
a.	Anthracite and Bituminous.	Anthracite.
c.	Pea.*	Egg.
d.	Beaver Meadow, and George's Creek Cumberland.	Wilkesbarre and Reading hard.
e.	Price per gross ton delivered,	
	$3.91	$5.32
g.	Wood, price per cord,	
	$4.50	$5.00
3.	Coal consumed for the year, in pounds,	
	5,242,600	908,420
4.	$\frac{\text{Pounds of wood consumed.}}{3}$ = coal in pounds.	
	450	1,362
5.	Total fuel consumed for the year, (3)+(4) in pounds,	
	5,243,050	909,782
6.	Total pumpage for the year in gallons,	
	3,552,860,464	538,771,535

*Pea coal for heating building.

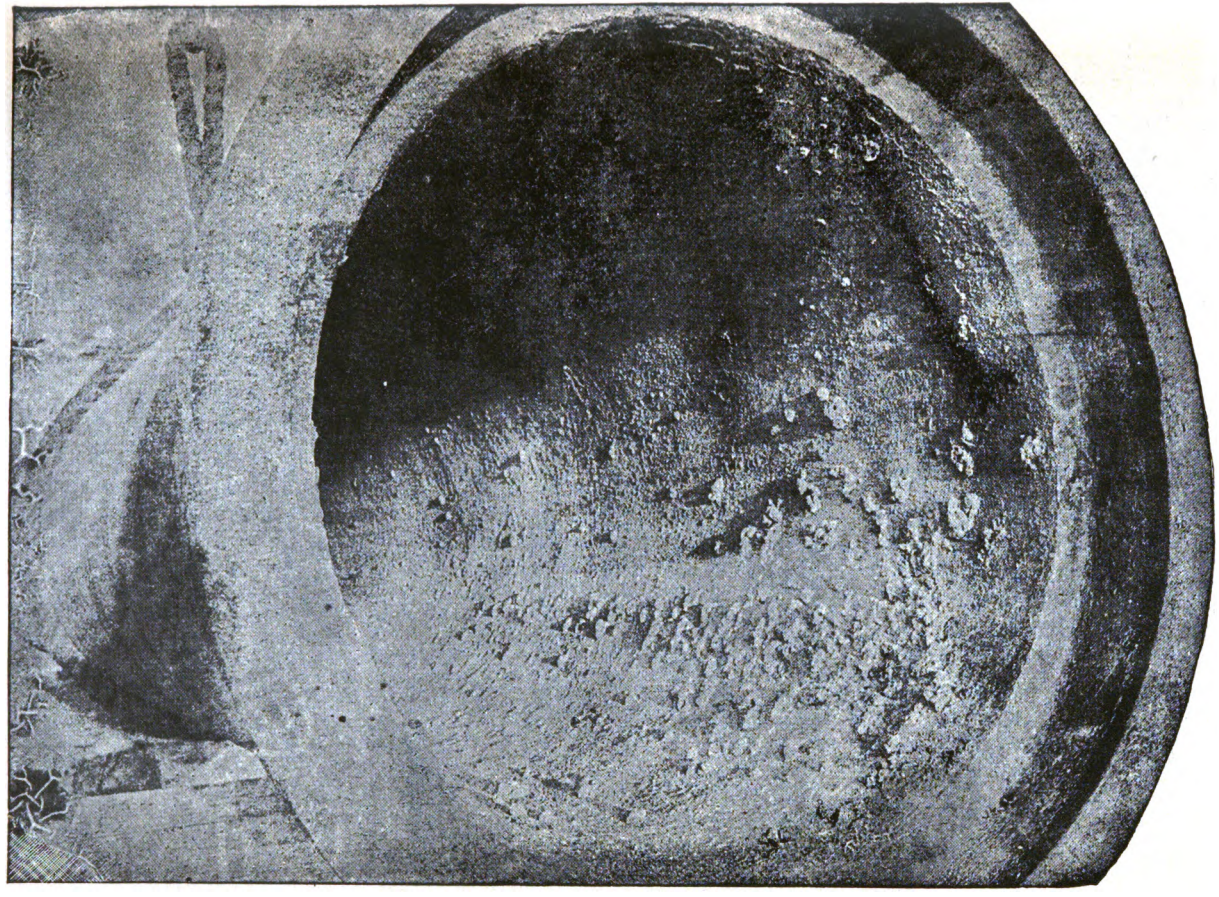


PLATE IV.

	Worthington Triple Expansion.	Holly High Service.
7. Average static head against which pumps work,	170.30	112.00
8. Average dynamic head against which pumps work,	175.88	139.00
9. Number of gallons pumped per pound of coal (3),	678	593
10. Duty in foot pounds per 100 pounds of coal, using following formula, making no deductions for starting or banking fires, heating buildings, or anything else. Duty = Gallons pumped (6) x 8.34 (lbs.) x 100 x dynamic head (8), / Total fuel consumed (5).	99,397,800	68,651,200

COST OF PUMPING, FIGURED ON PUMPING EXPENSES, INCLUDING COST OF FUEL, SALARIES, OIL, WASTE, AND OTHER SUPPLIES, CLEANING ENGINES AND HOUSES, AND REPAIRING MACHINERY AND BOILERS, WAS $15,335.78 FOR THE LOW SERVICE, AND $5,940.54 FOR THE HIGH SERVICE.

11. Per million gallons raised against dynamic head (8) into low service reservoir, the cost was	$4.32
Into high service reservoir (pumped twice, $4.32+$11.03)	15.35
12. Per million gallons raised one foot high (dynamic), low service, the cost was	0.0245
High service (pumped twice, $0.0245+$0.0793), the cost was	0.1038
Net cost of works to date	$6,417,699.33

CONSUMPTION.

1. Estimated total population of district at date	170,200
4. Total number of gallons consumed for year	3,339,382,586
7. Average daily consumption	9,148,993
8. Gallons per day to each inhabitant	54
10. Gallons per day to each tap (Distribution 22)	447

DISTRIBUTION.

MAINS.*

1. Kind of pipes used	Cast iron.

* Not including high pressure fire service.

2.	Size	From 6 to 36 inches.
3.	Extended	26,162.06 feet.
4.	Discontinued	2,365.41 feet.
5.	Total now in use †	314.8528 miles.
8.	Small distribution pipes, less than four inches, total length	None.
9.	Hydrants added*	28
10.	Number now in use*	1,815
11.	Stop gates added	75
12.	Number now in use	3,286
14.	Number of blow-off gates	32
15.	Range of pressure on mains at centre of city for day and night	64 to 73 lbs.

HIGH PRESSURE FIRE SERVICE.

Kind of pipes used	Cast iron.
Size	12, 16, and 24-inch.
Total now in use ‡	5.5698 miles.
Hydrants added	2
Number now in use	91
Stop gates now in use	31
Number of blow-off gates	4
Pressure on mains at centre of business portion of city for day and night	114 lbs.

SERVICES.

16.	Kind of pipes used	Lead from ½ to 1¼ inches, and cast iron.
17.	Size	From ½ to 10 inches.
21.	Services added	566
22.	Number now in use	20,473
25.	Meters added	709
26.	Number now in use	16,388
27.	Elevator supplies added	8
28.	Number now in use, 129 of 4 and 6-inch, and 17 smaller supplies connected to house elevators.	

† Includes 10,084 feet of 36-inch pipe, 561 feet of 30-inch pipe, and 695 feet of 24-inch pipe, which are force mains, and 19.66 feet of 30-inch pipe, and 19,478.46 feet of 24-inch pipe, which are used both as a force and delivery main.

‡ No connections of any description except for city fire hydrants.

REMARKS.

The Cornish engine was not run during the year.
The Worthington Duplex engine was not run during the year.
The Corliss Vertical engine was not run during the year.
The Worthington Triple Expansion engine was run on 317 days.
The Nagle engine was not run during the year.
The Holly engine was run on 314 days.

SEWAGE SYSTEM.

Two and six hundred thirty one-thousandths miles of regular sewers have been built during the year 1898, of which 2.317 miles were of pipe, and 0.313 miles were of brick, making the total length to date 112.211 miles of pipe, and 33.096 miles of brick sewer.

In addition to the regular sewers, 0.985 miles of sewers have been built under the appropriation for improved sewerage, making a total of 3.615 miles of sewers built during the past year, and a total of 168.904 miles of sewers in the sewerage system.

The number of house connections made in 1898 was 866, making the total number connected to date 14,064. In addition to this there were granted for the year 667 extension permits.

The construction of the precipitation tanks, section two of the disposal division of the improved sewerage system, was commenced in April, and has been pushed forward as rapidly as circumstances would permit. Nearly all the excavation has been made, and about one-third of the concrete work is now finished. With the facilities now at hand for pushing the work, it seems possible that the close of this season will see it completed and at least partially in use.

The pumping machinery has run continuously during the year, and in a very satisfactory manner.

The total amount of sewage pumped for the year is estimated at 4,974,129,807 gallons, at an expense for labor, fuel, work in screen chamber, and all other charges, of $12,535.94, or $2.52 per million gallons pumped. The average amount pumped daily is shown by the following table:

Daily average for the year	13,627,753 gallons.
Daily average for wet weather	16,540,742 gallons.
Daily average for dry weather	11,685,760 gallons.
Sunday average for dry weather	7,488,190 gallons.

Number of wet days	146
Number of dry days	219
Number of wet Sundays	85

PUBLIC PARKS.

The total area of land devoted to park purposes in the city is 541,017 acres.

The three largest tracts are :

Blackstone park	35,976 acres.
Davis park	38,342 acres.
Roger Williams park	426,906 acres.

In Roger Williams park 117.44 acres of the area is devoted to lakes, containing five islands of about 35 acres.

3. The construction of the precipitation tanks for the sewage system is progressing steadily.

4. The removal of the privy vaults on sewered streets in the compact part of the city has been continued. The plumbing law continues in good effect.

5. The board of aldermen is the board of health.

6. The health officers are: Charles V. Chapin, M. D., superintendent of health; Charles H. Leonard, M. D., vaccinating physician; Eugene P. King, M. D., medical inspector; Walter J. Lewis, sanitary inspector.

7. Gratuitous vaccinations were afforded to a large number of school children, and a certain number of adults were vaccinated. A detailed report of this work will be found under the report of the health officer.

SCITUATE.

1. Nothing for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

5. This town has no legal board of health other than the town council.

6. George R. Barden, M. D., health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have made returns of deaths promptly.

9. Clergymen are prompt in making returns of marriages.

DANIEL H. REMINGTON, *Town Clerk.*

SMITHFIELD.

1. Nothing special for the promotion of the public health has been done during the year.

4. (Nuisance and contagious disease ordinances, see report of 1894, pp. 48–50.)

5. This town has no legal board of health other than the town council.

6. Jenckes Smith, health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have made returns of deaths promptly.

9. Clergymen make returns of marriages promptly.

OSCAR A. TOBEY, *Town Clerk.*

WOONSOCKET.

2. Twenty-three thousand of the population are supplied by the public water service of this city.

3. The aggregate length of sewers in this city is six and one-half miles. A few connections with the same were made during the fall. About one-twenty-fifth of the population are now connected.

5. The board of aldermen of this city constitutes the board of health.

6. Ara M. Paine, M. D., George N. Girard, and Leonard S. Allen, health officers.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have made returns of deaths promptly.

9. Clergymen do not make returns of marriages promptly, but are doing better than formerly.

WILLIAM C. MASON, *City Clerk.*

WASHINGTON COUNTY.

CHARLESTOWN.

1. Nothing in particular for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. All previous ordinances have been well enforced.

5. This town has no legal board of health other than the town council.

6. Herbert L. Stillman, M. D., health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have promptly made returns of deaths.

9. Clergymen make returns of marriages promptly.

GEORGE C. CROSS, *Town Clerk.*

EXETER.

1. Nothing for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year.

5. This town has no legal board of health other than the town council.

6. This town has no health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers do not make returns of deaths promptly.

9. Clergymen are prompt in making returns of marriages.

JOHN H. EDWARDS, *Town Clerk.*

HOPKINTON.

1. Nothing for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

4. (Contagious disease ordinances, see report of 1894, p. 59.)

5. This town has no legal board of health other than the town council.

6. George A. Langworthy, health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have made returns of deaths promptly.

9. Clergymen are prompt in making returns of marriages.

EDWIN R. ALLEN, *Town Clerk.*

NARRAGANSETT.

1. An order was promulgated by the district council for filling a portion of the Pier pond; although the area specified by the council to be filled has not been completed, still a good beginning has been made.

2. The water mains of this district have been extended about sixteen hundred feet during the year.

3. The present aggregate length of public sewers is about nineteen thousand five hundred and eighty feet, and the number of house connections during the year was fifteen.

4. No new sanitary ordinances have been enacted during the year. All previous ordinances have been well enforced.

6. Solomon H. Hale, health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have not made returns of deaths promptly.

9. Clergymen are prompt in making returns of marriages, generally speaking.

WILLIAM H. CASWELL, *District Clerk.*

NORTH KINGSTOWN.

1. Nothing for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. (Nuisance and contagious disease ordinances, see report of 1896, p. 60.)

5. This town has no legal board of health other than the town council.

6. Harold Metcalf, M. D., health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have made returns of deaths promptly.

9. Clergymen are prompt in making returns of marriages.

THOMAS J. PEIRCE, *Town Clerk.*

RICHMOND.

1. Nothing for the promotion of the public health has been done during the year.

2. This town has no public water service.

3. This town has no sewage system.

4. No new sanitary ordinances have been enacted during the year. (Contagious disease and nuisance ordinances, see report of 1894, p. 61.)

6. John L. Kenyon, health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have been very punctual in making returns of deaths.

9. Clergymen make returns of marriages promptly.

HALSEY P. CLARKE, *Town Clerk.*

SOUTH KINGSTOWN.

1. Nothing for the promotion of the public health has been done during the year.

4. (Contagious disease ordinance, see report of 1896, p. 64.)

5. This town has no legal board of health other than the town council.

6. John P. Case, health officer.

7. Gratuitous vaccination has not been provided during the year.

8. Undertakers have been more prompt than heretofore in making returns of deaths.

9. Clergymen do not always make returns of marriages promptly.

HOWARD B. PERRY, *Town Clerk.*

WESTERLY.

2. The following data in reference to the improvement of the water service is extracted from the report of water commissioners:

WATER SUPPLY.

May 2, 1896, a contract was entered into between the town of Westerly and B. F. Smith & Bro., of Boston, Mass., for a system of driven wells capable of producing 1,000,000 gallons per day, to be located on a plat of land near the White Rock road. Twenty-nine wells were driven by the contractors, and an official test of the same was made September 20, 1897.

The following report of the test was made by Mr. Samuel M. Gray, consulting engineer.

PROVIDENCE, R. I., Oct. 4, 1897.

L. W. ARNOLD, *Chairman Water Committee:*

DEAR SIR:—At your request I have had a test made for capacity of the wells driven at White Rock, by B. F. Smith & Bro., for the Westerly Water Works.

The contract between the town of Westerly and B. F. Smith & Bro. calls for not less than twenty-five wrought-iron pipe wells, two and one-half inches in diameter, and capable of delivering at least one million gallons of water in twenty-four hours.

Each well to be provided with an independent valve, and properly connected with a sixteen-inch cast-iron pipe.

A vacuum chamber or sand catcher provided with a glass column and vacuum gauge was to be furnished and connected with the suction pipe in the basement of the pumping station.

The contractors have driven twenty-nine wells, all of which have been provided with independent valves and connected with the suction pipe.

In making the test of this system of wells three of them were shut off from the direct action of the pump for the purpose of taking elevations of the ground water during the running of the pump, leaving twenty-six wells to draw from. The test was made with one of the new one million gallon pumps, erected at the White Rock Pumping Station by H. R. Worthington, the water being pumped over a weir and discharged into a small brook in the rear of the station. The test was started at 2 o'clock P. M., September 20th, and continued for three days and nights, or seventy-two hours, without interruption.

Hourly records were kept of the number of revolutions made by the pump, as well as of the depth of water passing over the weir.

Notes were carefully taken of the elevation of the water in the wells previous to starting the pump, and subsequently were taken at each hour during the run.

A profile accompanying this report shows the amount of water pumped each hour during the run, and the elevation of the ground water in one of the test wells that had been shut off from the system located near the station. Records were kept of the elevation of ground water in two additional wells located nearer the end of the system. The water in these last two wells did not draw down as low as the one used for the profile.

During the seventy-two hours run the pump made 249,546 revolutions. The pump plungers are ten and one-quarter inches in diameter, and with a ten-inch stroke. The displacements in both water cylinders will amount to 13.94 gallons per revolution, giving 3,487,670 gallons as measured by the revolution counter.

But as the full stroke of the engine was not maintained throughout the test, and some allowance must be made for the slip, it was thought best to use the weir measurements for determining the quantity of water pumped.

The weir was 3.81 feet long, made of wrought-iron planed bevelling on the edge so as to give the best results. The water averaged 0.264 feet on

the weir, amounting to 3,336,840 gallons; adding the estimated quantity of water for boiler feed for seventy-two hours, or 16,420 gallons, we have 3,353,260 gallons, or at the rate of 1,117,420 gallons per twenty-four hours; exceeding the contract quantity by 117,420 gallons from the twenty-six wells.

The quantity of water as measured by the plunger displacement, or counter readings, exceeds the weir measurements by about three and one-half per cent. The amount of water used for the boiler was not measured, but it is estimated at 228 gallons per hour from subsequent measurements under similar conditions. The boiler feed water was taken from the force main before its discharge into the weir box.

During the trial the water in the test well was drawn down from elevation 10.22 to elevation 1.00 or 9.22 feet for an average drop of the ground water. The vacuum gauge of the vacuum chamber indicated that the water in the wells was drawn about one foot lower.

At the conclusion of the seventy-two hour test the water in the wells rose again to within one foot of the original height in one-half hour, showing that there is an abundance of water in the ground from which the supply is drawn.

Both pumps were started after the water had risen to nearly its normal height, and each one was run at an average speed of thirty-eight revolutions per minute for one hour, taking suction water from the twenty-six wells and delivering at the rate of 1,384,000 gallons per twenty-four hours.

This condition drew the ground water in the test wells down eleven feet below its normal height, where it remained, showing that the above quantity of water could be had for a short time at least if circumstances required it.

In pumping continuously from a driven well system air will accumulate in the top of the vacuum chamber, but is easily removed by the air pump. The air pump was run very slowly, showing that the joints in the well system are practically air-tight. I fully believe B. F. Smith & Brother have peformed their part faithfully and are therefore entitled to a final settlement.

Yours truly,

(Signed,) SAMUEL M. GRAY.

The new supply was put in continuous operation October 16, 1897, and no trouble has been experienced in obtaining all the water required.

The elevation of the ground water, as shown by the vacuum gauge on the vacuum chamber, has remained nearly constant during the running of the pump, varying only from twelve to thirteen and one-half inches of vacuum from October 16, 1897, to May 1, 1898.

The quality of the water remains unchanged, and has fully sustained the claims made for it by those who have supported and advocated the change from Shunock Brook water to the well system. The water has proven excellent for domestic and manufacturing purposes.

The statement has been repeatedly made that the water would be wholly unfit for use in steam boilers, causing scale or incrustation. The ground on which this statement is based can be found only in the almost universal belief that all well waters are objectionable for boiler use, for in this case analysis and experience have proven that there is no reason for such statements.

The boilers at the pumping station are supplied with water direct from the wells, and alternately have been in continual use since August 28, 1897. April 9 and 10, 1898, an internal inspection of the boilers was made by Inspector B. W. Dillon, of the Hartford Steam Boiler Inspection and Insurance Co., and the following report of the condition of the boilers was submitted by the company:

"Internally: — The shells, tubes, and heads are free from incrustation and deposits. A slight corrosion in the form of pitting was noted on shell and tube, but it is not serious. The braces are sound and taut. Laps and flanges are free from fractures. Openings to connections are clear. Safety plug was intact."

"Externally: — A very slight surface corrosion was noted on shell and heads. Tube ends show no signs of leaks. Seams show no sign of fractures. Appliances are in working order. Brick work is in good condition. Gauges were tested and corrected. We would add that the quality of water used is first-class for steam boilers, leaving no incrustation or deposit."

(Signed,) C. E. ROBERTS,
Manager.

The William Clark Co., who are large consumers of water at their manufacturing plant in Pawcatuck, Conn., sent a sample of the water to the New York Fidelity and Casualty Co., of New York, the company which carries the insurance on their boiler plant, for analysis, and they received word from the company that there was nothing in the water which should cause them any trouble. By courtesy of Mr. William Clark, Jr., the following copy of the analysis of the water by the New York Fidelity and Casualty Co. was obtained:

	Grains per U. S. Gallon.
Sodium Carbonate,	0.00
Lime Carbonate,	0.40
Magnesia Carbonate,	0.31
Lime Sulphate,	0.37
Magnesia Sulphate,	0.00
Sodium Chloride (Salt),	1.17

	Grains per U. S. Gallon.
Free Acid,	0.00
Iron Oxide and Silica,	0.19
Volatile and Organic,	0.86
Total Solids,	3.30

REPORTS OF

HEALTH OFFICERS.

1898.

CIRCULAR TO HEALTH OFFICERS.

CIRCULAR No. 131.

OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH,

PROVIDENCE, January 1, 1899.

To the Health Officer:

DEAR SIR:—**An important feature** of the annual reports of the Rhode Island State Board of Health is that of giving a connected history of the occurrence of contagious and epidemic diseases from year to year, as they may have prevailed in the different towns, whether epidemically or in a less degree, together with the location in the town (village or otherwise) and season of the year.

If the **proportion** of the **fatal** cases to the **whole number** of cases of the same **disease** could be given, the value of such reports would be very much enhanced. Such proportion can be ascertained only in such towns as *by town ordinance* require physicians to report all cases of such diseases as come within their charge.

An approximate proportion can, however, be given, after the subsidence of the disease, by inquiry of persons living in the immediate neighborhood of the prevalence of such disease, as to the number of the sick, or by house to house visitation where the sickness occurred, with the same inquiry, and by the comparison of the deaths with recoveries as so ascertained.

It is for the purpose of obtaining such information, in full or approximate, and also what may have been done to prevent and restrict diseases, that the questions in the inclosed circular are sent to the various health officers of the State.

To Health Officers who are not physicians, it may be said that the term **epidemic**, within the meaning of the questions proposed, is the prevalence of some disease to the extent of one or more persons affected with the disease to every five or six persons living in adjacent tenements or in the near neighborhood, or a smaller proportion, not less than one case of the disease

in every ten or twelve of the population, extending over a large area of territory. One sick in every twelve to sixteen persons might be called a **large prevalence**, and one sick in every twenty to twenty-five, a **moderate prevalence.** The number of cases of any one disease may have to be estimated, but make them as nearly correct as possible.

If, therefore, you will have the kindness to reply to the questions in the said circular, according to the best knowledge you have been able to obtain, and forward in the inclosed stamped envelope, you will favor one of the most important interests in the State, and greatly oblige,

Yours truly,

GARDNER T. SWARTS,

Secretary State Board of Health.

CIRCULAR No. 132.

DEAR SIR:—Replies to the following questions, as suggested in the accompanying circular (No. 131), are respectfully solicited; said replies to be made on this circular, following each question:

1. Name of town.

2. Name of health officer.

3. Have there been, within your knowledge, any epidemics, or any large prevalence of contagious or infectious diseases in your town during the past year? If so, of what disease or diseases? in what locality or localities? how many of each disease?* number of deaths? and in what months of the year?

Diseases.	Locality.	No. of cases.	No. of deaths.	Months in which they occurred.

4. Was isolation maintained or attempted?*

5. What proportion of the sick, if any, were isolated?

*According to the best knowledge obtainable.

6. Was any inspection of premises made, where sickness prevailed, as to the sanitary condition of the cellars, pantries, sinks, sink-drains, water-closets, if any, cess-pools, out-house privies, distance of wells from accumulations of filth, etc., etc.? If so, please give a general statement as to whether they were sanitarily in conditions good or bad, or, if any thing or place was unusually unsanitary, give a full description. Or, if the cause of any outbreak of disease was found, please state what.

7. Did you make any sanitary inspections during the past year, by order of the town council or from your own option? If so, what were they and how made?

8. Do you know of any location in your town that seems to be particularly unhealthy to any considerable number of persons? If so, and the cause is suspected, can such cause be removed at any reasonable expense?

9. Do you report to your town council nuisances dangerous to the public health, or unsanitary premises within your knowledge; or of buildings unsafe for occupants in case of fire? (See Chapter 495, Section 6, Public Laws.)

10. Has there, to your knowledge, been any contamination of any of the water, milk, or ice supplies in your town?

11. Please give names and addresses of dealers in ice in your town.

REPORTS OF HEALTH OFFICERS.

BRISTOL COUNTY.

1. BARRINGTON.

2. Charles H. Bowden, health officer.

3. With the exception of La Grippe, no epidemics occurred in this town during the year. The contagious diseases reported were as follows: scarlet fever, six cases; diphtheria, one case; and typhoid fever, two cases. All these cases occurred during the months of November and December, and none of them were fatal.

4. Isolation was rigidly maintained.

5. Seven out of the nine cases were isolated.

6. Inspection of premises where sickness prevailed was made, but no unsanitary conditions of an extent to cause disease were found.

7. At my option, I inspected three cess-pools and caused the existing conditions to be rectified.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council. Buildings unsafe in case of fire are not reported by me.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. E. Tiffany, of Barrington, and William A. Leonard, of Drownville, are the ice dealers of this town.

1. BRISTOL.

2. George H. Peck, health officer.

3. There have been no epidemics in this town during the year. The contagious diseases reported were as follows: scarlet fever, six cases; typhoid fever, two cases; and measles, one case. None of these were fatal.

4. Isolation was maintained.

5. All of the sick were isolated.

6. Inspection of premises where sickness prevailed was made and sanitary conditions found fair in all instances.

7. Several personal inspections of cess-pools, water-closets, and yards were made during the year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. John P. Reynolds and Terence P. Morris are the ice dealers of this town.

1. WARREN.

2. Abraham Bowen, health officer.

3. Scarlet fever was quite prevalent in this town during the months of September, October, and November, there being seventeen cases, none of which were fatal, however.

4. Isolation was maintained.

5. Nearly all the sick were isolated.

6. Inspection of premises where sickness prevailed was made, and but a small proportion of those afflicted were found to be living under unsanitary conditions. The cause of the outbreak could not be satisfactorily determined.

7. Several sanitary inspections, from my own option or from private information, were made during the year. These referred largely to drains, privies, barns, refuse deposits, etc.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council. Buildings unsafe in case of fire are not reported by me.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. E. Tiffany, of Barrington, William A. Leonard, of Drownville, Walter Bosworth, and George Gardner are the ice dealers of this town.

KENT COUNTY.

1. COVENTRY.

2. John Winsor, M. D., health officer.

3. There were no epidemics in this town during the year. The only contagious diseases reported were two cases of scarlatina in the village of Anthony during the month of May. Neither of these resulted fatally.

4. Isolation was maintained.

5. All of the sick were isolated.

6. Inspections of premises where sickness prevailed were made, and sanitary conditions found to be good. No cause for the sickness could be found.

7. No sanitary inspections were made during the year.

8. No unhealthy localities in this town are known.

9. Public nuisances, unsanitary premises, etc., are not reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. Job Manchester is the ice dealer of this town.

1. EAST GREENWICH.

2. Elbridge G. Carpenter, M. D., health officer.

3. There were no epidemics in this town during the year.

7. Sanitary inspections of cess-pools, privy vaults, etc., were made during the year.

8. No unhealthy localities in this town are known.

9. Public nuisances, unsanitary premises, etc., are not reported to the town council. All such reports are made to me.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. E. A. Sweet and George W. Sunderland are the ice dealers of this town.

WEST GREENWICH has no health officer.

1. WARWICK.

2. Albert G. Sprague, M. D., health officer.

3. There were no epidemics in this town during the year. The contagious diseases reported were as follows: scarlet fever, forty cases and one death; diphtheria, ten cases and three deaths; and typhoid fever, one case and no deaths.

4. Isolation was maintained.

5. All of the sick were isolated.

6. Inspections of premises where sickness prevailed were made. In most of the diphtheria cases faulty sink-drains were found in close proximity to the houses.

7. All sanitary inspections made during the year were on complaint of individuals.

8. No unhealthy localities in this town are known.

9. Public nuisances, unsanitary premises, etc., are not reported to the town council unless the parties refuse to abate the nuisance.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. Manchester Bros., Hoxsie, A. J. Matteson, Sherwood, and Clapp & Co., are the ice dealers of this town.

NEWPORT COUNTY.

1. JAMESTOWN.—No report from the health officer.

1. LITTLE COMPTON.

2. Adam S. MacKnight, M. D., health officer.

3. There were no epidemics in this town during the year. Since the adoption of ordinances for the prevention of contagious and infectious diseases, in March 1898, only one case of contagious disease reported.

4. To the best of my knowledge, isolation was not maintained.

5. To the best of my knowledge, none of the sick were isolated.

6. Sanitary inspections of premises where sickness prevailed were made, but nothing of an unsanitary nature could be found.

7. Sanitary inspections of premises and suspicious wells were made, and in two instances the water from the latter was analyzed by the State Board of Health.

8. No unhealthy localities in this town are known.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. James L. Gray, of Adamsville, is the ice dealer of this town.

1. MIDDLETOWN.

2. George E. Ward, health officer.

3. The contagious diseases reported during the year were two each of scarlet fever and diphtheria, none of which, however, were fatal.

4. Isolation was not maintained.

5. None of the sick were isolated.

6. I was informed by the attending physicians that the surroundings of all the cases were sanitary and in good condition.

7. Sanitary inspections were made during the year.

8. No unhealthy localities in this town are known.

9. All nuisances not abated by my orders are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. The Newport Ice Company, of Newport, is the ice dealer of this town.

1. NEWPORT. No report from the health officer.

1. PORTSMOUTH.

2. Minot A. Steele, M. D., health officer.

7. Sanitary inspections of privies, cess-pools, etc., were made upon complaint of neighbors and by direction of the town council.

8. No unhealthy localities in this town are known.

9. I have had no occasion for reporting public nuisances, etc., during the year.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. William H. Tallman is the ice dealer of this town.

1. TIVERTON.

2. Edward P. Stimson, M. D., health officer.

3. There were no epidemics in this town during the year. The contagious diseases were sporadic, as reported monthly.

4. In all the cases brought to the notice of the health officer, isolation was maintained.

5. With the exception of typhoid fever, all the sick were isolated.

6. Inspections of premises where sickness prevailed were made. They were found in good sanitary condition, generally.

7. Sanitary inspections, when made, are at my own option.

8. No unhealthy localities in this town are known.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. Isaac F. Brownell, of Tiverton, and Seabury & Peckham, of Tiverton Four Corners, are the ice dealers of this town.

PROVIDENCE COUNTY.

1. BURRILLVILLE.—No reply from the health officer.

1. CENTRAL FALLS.

2. Charles F. Sweet, M. D., health officer.

3. Measles was prevalent during the months of April and May, there being ninety-seven cases, two of which were fatal.

4. Isolation was maintained.

5. All cases reported to the health officer were isolated.

6. Inspections of premises where sickness prevailed were made, and sanitary conditions found to be excellent.

7. Sanitary inspections were made during the year, and all nuisances investigated and abated.

8. No unhealthy localities in this city are known.

9. The health officer has the power to act in all cases of public nuisances, unsanitary premises, etc.; the building inspector in cases of buildings unsafe for occupancy in case of fire.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this city.

11. The Central Falls, Pawtucket, Seekonk, Moshassuck, South Attleboro, Crystal, and Union Ice Companies are the ice dealers of this city.

1. CRANSTON.

2. Dan. O. King, M. D. health officer.

3. There were no epidemics in this town during the year. The monthly

average of contagious diseases reported was as follows: diphtheria, two; scarlet fever, three; and typhoid fever, one per month.

4. Isolation was attempted.

5. All of the sick were isolated.

7. No sanitary inspections were made during the year.

8. The village of Cranston Print Works is not in a good sanitary condition.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. The Crystal Ice Company is the ice dealer of this town.

1. CUMBERLAND.—No reply from the health officer.

1. EAST PROVIDENCE.—No reply from the health officer.

1. FOSTER.

2. Henry Arnold, M. D., health officer.

3. Scarlet fever was prevalent in the village of North Foster during the months of May and June, there being eleven or twelve cases reported. None of these, however, were fatal.

4. Isolation was maintained.

5. All of the sick were isolated.

6. Inspections of premises where sickness prevailed were made, but sanitary conditions were found to be good, and no cause for which the outbreak could be held responsible was found.

7. The only sanitary inspections made during the year were in the above-mentioned scarlet fever cases.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. I know of no ice dealers in this town.

1. GLOCESTER.

2. George A. Harris, M. D., health officer.

3. There were no epidemics in this town during the year.

6. Inspections of premises where sickness prevailed were not made.

7. No sanitary inspections were made during the year.

8. No unhealthy localities in this town are known.

9. No occasion for reporting public nuisances or unsanitary premises has arisen during the year.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. Edward Place and Leward Hopkins, both of Chepachet, are the ice dealers of this town.

1. JOHNSTON.—No reply from the health officer.

1. LINCOLN.—No reply from the health officer.

1. NORTH PROVIDENCE.

2. Sanford E. Kinnecom, health officer.

8. All public nuisances, unsanitary premises, etc., are reported to the town council.

11. William A. Sweet, of Centredale, Charles O. Angell, of Geneva, and Arthur Gould, of Georgiaville, are the ice dealers of this town.

1. NORTH SMITHFIELD.

2. Remington P. Capwell, M. D., health officer.

3. There were no epidemics during the year.

7. Sanitary inspections of numerous cellars, sink-drains, and cess-pools were made during the year, and existing conditions rectified.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. C. R. Day, of Millville, Mass., is the ice dealer of this town.

1. PAWTUCKET.—No reply from the city physician.

1. PROVIDENCE.

2. Superintendent of health, Charles V. Chapin, M. D.; vaccinating physician, Charles H. Leonard, M. D.; medical inspector, Eugene P. King, M. D.

3. The following extracts from Dr. Chapin's report will fully answer all questions in circular No. 132:

INFECTIOUS DISEASES.

There were 288 deaths from diarrhœal diseases in 1898, or 23 more than in the preceding year.

There were 12 deaths from malarial disease in 1898, while in 1897 there were 18.

There were 325 deaths from phthisis in 1898, or 3 more than in the preceding year, but the ratio to the population was less than ever before.

The number of deaths from scarlet fever was 4, a number smaller than for any year since 1866, when there were only 3 deaths.

There were 39 deaths from typhoid fever, which, while 15 more than in 1897, is a very small number.

The number of deaths from diphtheria was 30, or 48 less than in the preceding year, and less than in any year since 1875.

Measles caused 3 deaths in 1898.

Physicians are now required to report this disease, but comparatively few cases are reported, due chiefly to the fact that in measles the doctor is rarely called. The number reported in 1898 was 48, in 1897 it was 84, in 1896 the number was 278.

Whooping cough caused 59 deaths in 1898.

DIPHTHERIA.

The use of the culture in assisting in the diagnosis of diphtheria increased during the year, and is now very general throughout the city. There are only a few physicians who do not put enough confidence in it to use it. In 1896 there were 229 cases of sickness reckoned as diphtheria and occurring in houses which were placarded on the physicians' diagnosis, but in which no cultures were taken. This was a little over 25 per cent. of all the cases occurring during the year. In 1897, of the 631 cases reckoned as diphtheria, only 68, or 17.7 per cent., occurred in houses where no culture was taken. In 1898, only 25, or 8.6 per cent. of the cases were in houses where no culture was taken. In 9 of these cases death occurred very early, so that the attendant could not conveniently have taken a culture. I do not mean to say that in the other cases positive cultures were obtained from each, but that one was obtained from at least one member of the family at the time the sickness occurred, or at the time of convalescence. It seems fair to consider all cases of pharyngeal inflammation under such conditions as due to the Klebs-Loeffler bacillus.

The following table shows the number and percentage of persons of different ages exposed to diphtheria who contracted it, and the number

who did not. This table includes both the Klebs-Loeffler diphtheria and clinical diphtheria. When I began to collect these facts in 1889, the inspector was not careful to obtain the age in every case, so that until 1890 only a portion of the cases are contained in the table, and it was only since 1893 that the facts in regard to all the adults in the family were obtained. The number exposed means all the members of the family where the disease occurred :

DIPHTHERIA.

Ages.	Cases.						Number Exposed.						Ratio of cases to number exposed.
	1889-90.	1891-95.	1896.	1897.	1898.	Total.	1889-90.	1891-95.	1896.	1897.	1898.	Total.	
Under 1 year	13	29	17	15	6	80	59	130	91	67	31	378	21.1
1 "	24	43	52	31	17	167	43	114	97	36	44	334	50.0
2 years	52	90	64	42	26	274	74	156	108	39	38	415	66.0
3 "	44	103	68	44	19	278	76	164	110	31	36	417	66.6
4 "	47	103	82	54	33	319	71	168	131	42	57	469	68.0
5 "	48	91	72	67	30	308	75	179	132	31	46	463	66.5
6 "	42	72	61	58	25	258	68	151	105	42	44	410	62.9
7 "	31	70	63	43	10	217	69	134	125	37	35	400	54.2
8 "	33	65	60	37	18	213	58	141	121	48	36	404	52.7
9 "	23	41	44	31	8	147	52	109	89	36	28	314	46.8
10 "	26	39	35	24	12	136	49	101	79	38	35	302	45.0
11 "	17	27	41	21	11	117	39	76	85	24	25	249	46.9
12 "	27	43	20	19	13	122	53	96	65	33	33	280	43.5
13 "	8	21	24	15	10	78	28	68	66	34	22	218	35.7
14 "	11	15	16	11	3	56	33	49	68	23	18	191	29.3
15 "	6	12	10	7	5	40	17	60	49	31	20	177	22.5
16 "	11	7	8	5	4	35	30	51	47	19	19	166	21.0
17 "	5	18	11	11	2	47	12	48	43	25	12	140	33.5
18 "	7	10	2	3	3	25	14	41	38	16	20	129	19.3
19 "	2	7	10	8	0	27	8	30	37	18	7	100	27.0
20 "	4	8	11	1	0	24	9	22	41	14	3	89	26.9
Adults	85	159	97	78	35	454	752	1286	1386	980	572	4976	9.1
Totals	566	1073	868	625	290	3422	1689	3374	3113	1664	1181	11,021	31.0

The cases which occurred in public institutions are not included in the above table.

One case developed in St. Joseph's Hospital. It was successfully isolated, and no others developed from it.

On December 18th a case was reported from the Shelter for Colored Children. It was at once removed to the isolation ward at the Rhode Island Hospital, and cultures were made from every person in the institution,—29 in all. One of these showed Klebs-Loeffler bacilli, and the child from whom it was obtained was also removed to the Rhode Island Hospital, and no other cases developed.

At the Rhode Island Institute for the Deaf the attending physician is in the habit of taking cultures from all case of sore throat that are brought to his attention. If Klebs-Loeffler bacilli are found, such cases are isolated or sent to the Rhode Island Hospital, even if they are not much sick. On January 10th one such case developed and was removed to his home, and cultures were taken from all persons who showed any faucial inflammation. All these were negative. On January 31st another case developed and was removed to the Rhode Island Hospital, and cautionary cultures were taken from suspicious throats. On March 27th and 28th two more cases developed and were managed in the same way. On November 27th there was another case, which was at once removed, and this time a negative culture was obtained from every one in the institution. On December 15th there was another case, and a negative culture was obtained from every one in the institution. None of the cases returned to the institution until at least two negative cultures had been obtained.

One case of diphtheria developed in a nurse in the general wards of the Rhode Island Hospital.

On November 9th, a case developed at the temporary home of the Society for the Prevention of Cruelty to Children. This case was on November 11th removed to the Rhode Island Hospital, and cautionary cultures taken from all persons in the house. One of these was positive, and though the patient was not sick she was removed to the hospital. Another set of cultures the next day resulted in the removal of another case. Cases of diphtheria subsequently developed on November 17th, 19th, and two on November 23d, and one on December 31st. One of these cases returned to the home the 21st of November, on which day a positive culture was obtained, although two successive negative cultures were taken in the hospital just before her return. After her return four successive negative cultures were obtained, but again a positive culture on December 23d, at which time she and also a fresh case went to the hospital. Another case

returned from the hospital on November 30th, after five successive negative cultures, but on December 21st she again showed Klebs-Loeffler bacilli. The disinfection of the rooms, which was done after each removal, was far from satisfactory. It would appear, however, that the infecting bacilli remained in the throats of one or more of the children rather than in the rooms, and that they were not detected by the cultures. It was suspected that the disease was brought to the home by a child who came to the home on October 31st, and had sore throat the next day, but the throat was not examined. She had been living just across the street from a case of diphtheria.

On March 9th a case of diphtheria was reported from the St. Aloysius Orphan Asylum and was removed to the Rhode Island Hospital, where intubation was done. This case occurred in the infirmary, where there were a number of children sick with measles and mumps. On March 13th a systematic examination of the throats of all persons in the institution was begun, but was not completed for several days. During this time three other cases of diphtheria with clinical symptoms developed, and forty-eight cases were found without such symptoms, but in which diphtheria bacilli were present. All cases with bacilli were isolated until two negative cultures were obtained from each. The asylum was then free from diphtheria until December 11th, when another case developed. Cultures were again taken from all the children, 216 in number, but no infected throats were found. No immunization was attempted. It was suspected that diphtheria was brought to the institution by two children who came from another institution where there had recently been diphtheria. Their throats were not examined until the outbreak, at which time diphtheria bacilli were found in one.

The following table is similar to that found on page 61, but contains only cases from families in which Klebs-Loeffler bacilli were found :

CASES IN WHICH KLEBS-LOEFFLER BACILLI WERE FOUND.

Ages.	Cases.				Number Exposed.				Ratio of cases to number exposed.
	1896.	1897.	1898.	Totals.	1896.	1897.	1898.	Totals.	
Under 1 year	11	10	6	27	66	68	31	160	16.8
" 1 "	37	27	17	81	77	33	44	154	53.8
" 2 years	48	36	26	110	91	35	38	164	67.0
" 3 "	49	37	19	105	94	27	36	157	66.8
" 4 "	61	50	33	144	114	38	57	209	68.8
" 5 "	48	62	30	140	113	28	46	187	74.8
" 6 "	47	54	25	126	91	38	44	173	72.8
" 7 "	47	41	10	98	104	29	35	168	58.3
" 8 "	50	36	18	104	102	43	36	181	57.4
" 9 "	39	29	8	76	73	33	28	134	56.7
" 10 "	30	22	12	64	66	35	35	136	47.0
" 11 "	31	16	11	58	79	23	25	127	45.6
" 12 "	13	17	13	43	49	29	33	111	38.7
" 13 "	19	13	10	42	53	30	22	105	40.0
" 14 "	13	11	3	27	59	21	18	98	27.5
" 15 "	10	4	5	19	40	29	20	89	21.3
" 16 "	8	5	4	17	33	16	19	68	25.0
" 17 "	10	9	2	21	32	23	12	67	31.3
" 18 "	2	3	3	8	26	11	20	57	14.0
" 19 "	8	6	0	14	29	13	7	49	28.5
" 20 "	5	1	0	6	31	13	3	47	12.7
Adults	75	64	35	174	995	862	572	2,429	7.1
Totals	661	558	290	1,504	2,417	1,472	1,181	5,070	29.6

The following shows certain facts in the natural history of diphtheria:

	1889-90.	1891-95.	1896.	1897.	1898.	Totals.
Number of families in which there was more than one child	233	574	433	326	161	1,727
Number of these in which there was more than one case	89	179	172	125	57	622
Number of children in all the above families	894	1,614	1,690	1,262	642	6,102

	1889-90.	1891-95.	1896.	1897.	1898.	Totals.
Number of these children who were attacked	422	750	793	578	287	2,830
Number of additional families with children in the same house	97	329	323	254	119	1,122
Number of children in these families	262	854	898	665	311	2,990
Number of these additional families attacked	18	24	30	9	11	92
Number of children in these families who were attacked	25	28	55	26	12	146
Number of tenements which were disinfected where there were other families with children in the house	23	108	192	188	82	593
Number of instances of the above where the disease spread to other families in the house	5	10	11	9	11	46
Number of well children who were at once removed	54	202	141	176	71	644
Number of those who were attacked on their return	2	7	0	3	1	13

The single case that developed after the child who had been removed had returned, was nine days after disinfection, and after a single negative culture had been obtained from the child who was first sick.

There were sixty-seven children in the families of persons who were removed to the hospital. None of these were attacked on the return of the patient from the hospital, which was only permitted after two successive negative cultures were obtained from the throat.

The following table shows the number of persons exposed to diphtheria who had Klebs-Loeffler bacilli in their throats but who were not sick, and also the number exposed in the same families who did not have bacilli in their throats and who were not sick. This table may profitably be compared with the one on page 64, which shows the number of exposed persons who were sick;

WELL PERSONS IN FAMILIES WHERE THERE WAS DIPHTHERIA WHOSE THROATS WERE EXAMINED FOR DIPHTHERIA.

Ages.	Persons Examined.			Number in which Bacilli Were Found.			Percentage.
	1897.	1898.	Total.	1897.	1898.	Total.	
Under 1 year	36	3	39	6	.....	6	15.3
1 "	34	11	45	5	.....	5	11.1
2 years	32	3	35	11	.....	11	31.4
3 "	28	7	35	9	4	13	37.1
4 "	34	9	43	10	5	15	34.8
5 "	29	8	37	4	3	7	18.9
6 "	43	7	50	15	4	19	38.0
7 "	36	10	46	8	2	10	21.7
8 "	41	6	47	8	3	11	23.4
9 "	34	10	44	5	6	11	25.0
10 "	37	9	46	9	3	12	26.0
11 "	20	11	31	2	2	4	12.9
12 "	29	9	38	7	4	11	28.9
13 "	34	5	39	5	4	9	23.0
14 "	21	10	31	3	3	6	19.3
15 "	23	2	25	2	1	3	12.0
16 "	12	4	16	1	.....	1	6.2
17 "	16	5	21	3	3	6	28.5
18 "	13	5	18	1	1	2	11.1
19 "	9	4	13	2	1	3	23.0
20 "	10	1	11	0	.....	.....	.....
Adults	653	159	812	74	33	107	13.1
Totals	1,224	298	1,522	190	82	272	17.8

All the persons above mentioned who had diphtheria bacilli in their throats were isolated just as if they presented clinical symptoms. Of the 82 persons quarantined for the reason that bacilli were in their throats, 49 were children, and it is nowhere the policy to allow children in diphtheria families to mingle with the public whether their throats are examined or not. Of the 33 adults 21 were women, in most cases mothers or nurses who on no account would be permitted abroad. There were 12 adult men and a few children in their teens who were kept from work by this rule

that no person with diphtheria bacilli in the throat would be allowed to leave the house.

Complaint has also been made that placards are kept up longer than necessary because of the requirement of negative cultures from the well. As a matter of fact during the year cards were kept up on 20 houses for this reason. The additional days during which the card was kept on account of this rule was 25, 14, 13, 11, 10, 10, 7, 6, 6, 5, 5, 4, 4, 3, 3, 3, 3, 3, 2, 2.

It would be interesting to know how long the bacilli remain in the throats of persons who are well, but this can only be done by examining daily all persons in a family where there is diphtheria, which is manifestly impossible. Certain facts bearing upon this matter were noted in connection with the cases examined in this city. Of the 82 well persons in whom diphtheria bacilli were found, 3 escaped with only one culture; 27 cases gave more than one positive culture, and the average time between the first and last positive culture was 9 days. In 4 cases the bacilli persisted 20 days or more, viz., 25, 22, 22, 22 days respectively. In 55 cases only one positive culture was obtained, and the average time between this positive and the negative culture was 9 days.

SCARLET FEVER.

The following table gives the result of my observations during the past eleven years concerning certain points in the etiology and prevention of scarlet fever. This table for the years previous to 1892 does not include all the families and cases:

	1887-90.	1891-95.	1896.	1897.	1898.	Totals.
Number of families in which there was more than one susceptible child	615	1,600	305	174	178	2,872
Number of these in which there was a second case	334	711	128	58	68	1,299
Number of suceptible children in all the above families	2,270	5,571	1,082	644	655	10,172
Number of these children who were attacked	1,194	2,985	526	318	372	5,295
Number of additional families with susceptible children in the same house	273	817	197	122	113	1,532
Number of susceptible children in these families	799	2,259	545	340	295	4,238
Number of these additional families attacked	45	94	16	6	7	168
Number of children in these families who were attacked	81	157	41	9	12	300
Number of tenements disinfected where there were other families with susceptible children in the house	119	374	139	86	84	802
Number of above where the disease spread to other families in the house	10	9	10	0	7	36

	1887-90.	1891-95.	1896.	1897.	1898.	Totals.
Number of susceptible children who were at once removed	60	374	174	106	82	796
Number of these who were attacked on their return	4	20	5	0	4	33
Number of children who were exposed and who had previously had scarlet fever	...	278	112	62	63	515
Number of these who were attacked a second time	...	40	20	3	12	75
Number of adults who were exposed and who had previously had scarlet fever	...	541	120	79	87	827
Number of these who were attacked a second time	...	10	1	0	1	12
Number of families with susceptible children where there was isolation	...	285	51	48	42	426
Number of families where more than one child was attacked	...	97	17	27	11	152
Number of susceptible children in families where there was isolation	...	758	161	143	154	1,216
Number of the above who were attacked.	...	309	83	60	60	512

Of the 82 well children who were removed from their homes 4 were attacked on their return. Of these, 1 was away 3 days, and 1 was away 15 days. In another case the child was away 31 days, and was taken sick within a few hours of its return. One child was taken sick on the 12th day of its absence while still away, and one on the 22d day. It is not likely that there was entire separation in either of these cases. There were also 18 susceptible children in families of persons who were removed to the hospital. In one instance, after return of the patient from the hospital another child in the family contracted the disease. In this instance the first child was in the hospital 40 days, and until desquamation had ceased. The second child was taken sick 4 days after the return of the first.

The following table shows the number and percentage of persons of different ages exposed to scarlet fever who contracted it, and also the number who did not. When I began to collect these facts the inspector was not careful to obtain the age in every case, so that until 1890 only a portion of the cases are contained in the table, and it was only in 1894 that the facts in regard to all the adults in the family were obtained:

SCARLET FEVER.

Ages.	Cases.						Number Exposed.						Ratio of cases to number exposed.
	1887-90.	1891-95.	1896.	1897.	1898.	Total.	1887-90.	1891-95.	1896.	1897.	1898.	Total.	
Under 1 year	29	117	10	11	7	174	117	425	49	24	38	653	26.6
1 "	39	160	34	15	9	257	98	362	34	19	37	545	47.1
2 years	108	257	43	24	29	461	198	478	32	28	44	770	59.8
3 "	108	320	54	32	31	545	190	554	25	19	46	834	65.3
4 "	116	309	59	35	25	544	186	518	26	16	42	788	69.0
5 "	91	383	61	32	41	608	197	621	24	13	61	916	66.3
6 "	113	348	52	30	32	575	188	559	27	12	47	833	69.0
7 "	103	326	53	32	32	546	169	581	23	15	48	836	65.3
8 "	83	223	43	31	17	397	168	436	30	10	36	680	58.3
9 "	74	194	27	18	19	332	166	380	21	17	39	623	53.2
10 "	51	157	33	14	15	270	96	339	19	15	38	507	53.2
11 "	43	113	23	4	10	193	104	252	19	16	26	417	46.2
12 "	34	104	23	8	8	177	104	266	22	13	21	426	41.5
13 "	33	69	7	6	12	127	88	199	24	14	23	348	37.0
14 "	21	67	11	4	8	111	76	191	23	19	23	332	33.4
15 "	18	41	8	2	1	70	67	142	13	13	12	247	28.3
16 "	12	33	8	4	1	58	47	139	20	16	14	236	24.5
17 "	8	28	5	3	1	45	33	104	15	18	12	182	24.7
18 "	4	19	3	....	5	31	10	98	19	14	15	156	19.7
19 "	6	17	3	5	....	31	16	86	22	12	10	146	21.2
20 "	8	17	....	....	2	37	18	76	23	8	12	137	19.7
Adults	42	169	23	13	15	262	106	2,952	838	506	510	4,912	5.3
Total	1,144	3,471	588	328	320	5,841	2,427	9,758	1,348	832	1,154	15,519	37.6

Besides the above there were in 1898 one case of scarlet fever which developed in the St. Aloysius Asylum, and one in the Institute for the Deaf. Both were promptly removed to the hospital, and no subsequent cases occurred.

SWILL.

During the year the swill has been collected by Messrs. A. H. and J.

Barney, under contract with the city which expires May 1, 1899. The payment for the service is 15½ cents per annum for each person in the city, the population of the city to be estimated for that purpose each year by the city registrar. At this rate they were paid $2,040.83 each month during the year ending May 1, 1898, and $2,144.17 per month since that time.

BABY FARMS.

In 1897 there were eight baby farms licensed under chapter 464 of the public laws. These eight parties were licensed to care for twelve children collectively. At the present time (January, 1899), there are seven persons licensed to receive as boarders thirteen children. There are no baby farms in the ordinary acceptation of the term in the city, that is there are no places where large numbers of children are kept together under poor surroundings and with neglect of all sanitary precautions. This is owing partly to the new law and partly to the provision made by the St. Vincent de Paul Asylum and the Lying-in-Hospital for those persons who would otherwise be patrons of baby farms.

DISINFECTION.

Disinfection after contagious disease in the city is not compulsory, and is only done at the request of the family. It is done by this department without charge.

Formaldehyde disinfection has been done in nearly every instance, and usually by means of the Sanitary Construction Company's apparatus. During the latter part of the year formalin was evaporated in Novy's apparatus. Considerable steam disinfection is also done. Corrosive sublimate and formalin are left at nearly every infected house with directions as to their use.

VACCINATIONS.

During the year 1898 the number of person vaccinated was 2,137. The only public vaccination has been at the fourth ward room on Fountain street, Saturday afternoons. Humanized virus chiefly is employed. The number of transfers of humanized virus in 1898 was 18, making the total number of transfers since 1868, when an accurate record was begun, 605. The number of certificates of vaccination issued was 2,430. The following table gives the number of persons vaccinated and the number of certificates issued from 1856 to 1880, and during each year since that time:

Year.	Persons Vaccinated.	Certificates Issued.
1856–1880	24,142	32,585
1881	2,307	1,655
1882	1,694	1,690
1883	1,385	1,601
1884	1,137	2,725
1885	17,034	1,776
1886	625	1,856
1887	917	1,437
1888	894	1,676
1889	1,136	1,344
1890	1,438	1,765
1891	1,738	2,112
1892	2,440	2,407
1893	1,905	2,359
1894	3,086	2,809
1895	1,511	2,050
1896	1,963	2,536
1897	2,218	2,900
1898	2,157	2,430
Total, 1856–1898	69,707	69,713

1. SCITUATE.

2. George R. Barden, M. D., health officer.

3. Scarlet fever was prevalent in the village of North Scituate during the last four months of the year, there being twenty-six cases, one of which was fatal.

4. Isolation was maintained.

5. Seven-eighths of the sick were isolated.

6. Inspections of premises where sickness prevailed were made and sanitary conditions found to be good.

7. No sanitary inspections, except in the above mentioned cases, were made during the year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

1. SMITHFIELD.

2. Jenckes Smith, health officer.

3. There were no epidemics in this town during the year.

4. Isolation was maintained.

5. All of the sick were isolated.

6. Inspections of premises where sickness prevailed were made.

7. Sanitary inspections, by order of the town council, were made during the year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. William Winsor, of Greenville, and Arthur Gould, of Georgiaville, are the ice dealers of this town.

1. WOONSOCKET.

2. Ara M. Paine, M. D., George N. Girard, and Leonard S. Allen, health officers.

3. There were no epidemics in this city during the year.

4. Isolation was maintained in all cases of contagious and infectious diseases.

5. All cases of contagious and infectious diseases are isolated.

6. Inspections of premises where sickness prevailed were made, and sanitary conditions were found to be good in some instances and bad in

others, but in no instance could the sanitary condition of the premises be held responsible for the outbreak of disease.

7. No sanitary inspections were made by direct order of the board of health, but a large number from suggestion and by request of interested citizens when unsanitary conditions were supposed to exist.

8. No unhealthy localities in this city are known.

9. All public nuisances, unsanitary premises, etc., are reported to the board of health.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this city.

11. George H. Miller, of this city, and Andrew J. Kelly, of East Blackstone, Mass., are the ice dealers of this city.

WASHINGTON COUNTY.

1. CHARLESTOWN.—No reply from the health officer.

1. EXETER.—Has no health officer.

1. HOPKINTON.

2. George A. Langworthy, health officer.

3. There were no epidemics in this town during the year. Four cases of diphtheria were reported during the year but none of them were fatal.

4. Isolation was maintained.

5. All of the sick were isolated.

6. In the above mentioned cases the houses were found to be in good sanitary condition. The disease was probably imported from some other State or town.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. Samuel Avery & Co., Henry F. True, John Smith, H. G. Kenyon, and Charles W. Clarke are the ice dealers of this town.

1. NARRAGANSETT DISTRICT.

2. Solomon H. Hale, health officer.

3. The only case of contagious disease reported during the year was one of typho-malaria, during the month of September.

4. In the above case isolation was maintained.

6. Inspection of the premises was made and same were put in good sanitary condition.

7. One inspection in regard to a swill nuisance was made and same was abated.

8. No unhealthy localities in this district are known.

9. I have had no occasion to make any reports of public nuisances, unsanitary premises, etc., to the district council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this district.

11. Browning & Griffin, of Narragansett Pier, Charles Priday, of Peacedale, and I. Blanchard, of Wakefield, are the ice dealers of this district.

1. NORTH KINGSTOWN.

2. Harold Metcalf, M. D., health officer.

3. There were no epidemics or prevalence of any diseases during the year.

6. Inspections of premises showed them to be free from diseases which are due directly or indirectly to unsanitary conditions.

7. Several sanitary inspections were made at my own option; occasionally on complaint of private parties.

8. No unhealthy localities in this town are known.

9. Public nuisances, unsanitary premises, etc., are not reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. The Duck Cove Farm, James B. Brayman, George Orpen, and Rose & Artist are the ice dealers of this town.

1. RICHMOND.—No reply from the health officer.

1. SOUTH KINGSTOWN.

2. John P. Case, health officer.

3. There were no epidemics during the year.

4. Isolation was maintained in all contagious diseases.

5. All cases which came to the observation of the health officer were isolated.

7. Several sanitary inspections were made during the year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. Isaac Blanchard and George Priday are the ice dealers of this town.

1. WESTERLY.

2. E. Howard Clark, health officer.

7. From my own option, several sanitary inspections were made during the year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk, or ice supplies of this town.

11. L. D. Richmond and William T. Babcock are the ice dealers of this town.

WATER SUPPLIES.

WATER SUPPLIES.

WATER SUPPLIES.

In July, 1894, the board commenced a systematic monthly chemical and bacteriological examination of the waters of the Pawtuxet river. This river supplies the greatest number of population of the State, the population of the city of Providence being 145,472 as determined by the State census of 1895.

The advantage of periodical examinations has a value in comparison of the results from month to month, and from year to year, and thereby a determination as to the possibility of contamination may be made. An individual examination made at any one time would alone be of little value, for if the sample taken showed a purity compared with samples from other rivers it would lead to a conclusion which would be misleading, since during all the rest of the year the supply might be poor in quality. Likewise an individual sample might be taken during peculiar and unusual conditions of the source of supply, whereby a water of a very poor quality would be obtained and on analysis might be condemned as a continuous supply for drinking purposes, yet it might be the case that eleven other samples taken at periodical intervals would show an average quality which would be up to the standard.

Another advantage of the periodical examination is the possibility of determining the opportunities for an outbreak of disease before the epidemic may occur, and to study the relation of epidemics to the supply; and after years of records it would be possible to obtain information which would give practical deductions.

Owing to the limited amount of appropriations received from the legislature, this work has been limited to the one supply re-

ferred to; and it is to be hoped that in future years a sufficient amount may be appropriated to enable the board to keep informed of the condition of the various supplies, some of which are controlled entirely by private corporations where care is sometimes diverted to the quantity rather than the quality.

The collections of the samples were not made on any particular date, but were collected usually on the Thursday coming nearest to the fifteenth of the month. This was done upon the suggestion given by the engineer's department of the State Board of Health of Massachusetts.

It was considered that a sample taken from the river on a particular date, as, for instance, the first or fifteenth of the month, would not give a fair average of the quality of the water, inasmuch as those dates might fall upon a Monday, in which case, the mills having been shut down since Saturday night, thirty-six hours would have passed, during which time the river was not being used at its maximum, and the maximum contamination would not be present. Likewise if the sample was collected on a Saturday, it would give the result of a whole week's contamination. Being taken on a Thursday would give a sample which would have a better average.

The locations from which the samples were taken from the Pawtuxet river were as follows: one from the north branch of the river at the village of Hope, at a point where the water enters the mill in the trench. The second sample was taken at Washington, on the southwest branch, at a point located above the mill and where the supply of the mill is taken in. The third sample was collected on the same day as the other two and some hours later, at the intake of the Pettaconsett pumping station and at the same point where the samples are collected by the city of Providence for their analyses.

The north branch from Hope to where the river meets the southwest branch at River Point flows a distance of about three and one-quarter miles and has a drainage area, as given by Mr. Weston, of the city engineer's department, of Providence, of about

107.79 square miles. The distance from Washington on the southwest branch to the point where it joins the north branch is about six miles and has a drainage area of about 67.79 square miles. From River Point to the intake at the Pettaconsett pumping station, where the third sample was taken, is about five miles and has a drainage area of about 19.42 square miles. The total area of the whole water-shed above the pumping station is 195 square miles.

Along this stream, at frequent intervals below the points where the first two samples were collected, there are numerous cotton and woolen mills from which, and from the towns which are made up of the population which supplies these mills with labor, produce a certain amount of refuse matter which finds its way into the river. In addition to this, the distance of the points where the different samples are taken would go to show that the sedimentation, which occurs at the various dams where the water is held back at these various mills, is not sufficient to reduce the amount of accumulated contamination to any appreciable extent.

The reports of the examinations of the water taken at these points are given below. The results are shown in parts in 100,000 as is customary in the reports made by the Massachusetts State Board of Health.

The first arrangement is made collectively by dates, giving the results of the examination of the samples taken at the different sources on the same day, which admits of comparison of the changes in the water from one point to the other.

The next arrangement is made collectively by dates at one point only and will give the differences which occur from month to month during the different seasons. This is followed by the arrangement of average by years of each place.

The chemical analyses were made by Mr. George E. Perkins, State assayer; and the bacteriological analyses were made by the Rhode Island Laboratory, which is under the direction of Gardner T. Swarts, M. D., and Jay Perkins, M. D.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Hope Village, collectively, by Months.

(Parts in 100,000.)

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
Jan. 13.....	less than usual	less than usual	less than usual	3.6	2.6	1.0	.002	.012	.012	trace	.4	trace	.0	.3	118
Feb. 24.....	less than usual	less than usual	as usual	2.8	1.6	1.2	.0	.02	.....	trace	.28	.0	.0	.25	1066
Mar. 17.....	less than usual	less than usual	less than usual	2.9	1.6	1.3	.001	.01	.01	trace	.3	trace	0.	.2	liquefied
Apr. 14.....	as usual	as usual	as usual	3.0	1.5	1.5	.0012	.014	.013	.001	.3	trace	.0	.35	600
May 19.....	more than usual	more than usual	as usual	3.0	1.0	2.0	.003	.013	.01	.003	.3	trace	.0	.3	1393
June 16.....	as usual	as usual	as usual	3.2	1.6	1.6	.00186	.02	.017	.003	.2	.01	.0	.4	509
July	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	157
Aug. 12	none	very slight	.6	5.0	1.2	3.8	.0019	.0178	.0178	.0	.4	.000	.000	.8	.....
Sept. 15.....	none	none	.2	4.6	2.4	2.2	.0015	.0145	.0145	.....	.55	.00	.000	.8	.....
Oct. 18.....	none	none	.2	3.4	1.1	2.3	.000	.012	.012	.000	.6	.000	.000	.90	.....
Nov. 23.....	none	none	.4	3.7	1.6	2.1	.000	.009	.009	.000	.6	.00	.000	.8	469
Dec.	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	.....

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Washington Village, collectively, by Months.

(Parts in 100,000.)

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
Jan. 13.....	less than usual	less than usual	less than usual	5.6	3.0	2.6	.0015	.012	.012	trace	.4	trace	.0	.3	807
Feb. 24.....	less than usual	less than usual	less than usual	3.0	2.0	1.0	.0	.01	.....	trace	.2	.0	.0	.25	1426
Mar. 17.....	less than usual	less than usual	less than usual	3.0	1.6	1.4	.0015	.011	.01	.001	.3	trace	.0	.3	liquefied
Apr. 14.....	as usual	as usual	as usual	3.2	1.2	2.0	.0015	.013	.013	trace	.35	trace	.0	.3	185
May 19.....	more than usual	more than usual	as usual	2.8	1.6	1.2	.004	.012	.01	.002	.35	trace	.0	.3	899
June 16.....	as usual	as usual	as usual	3.8	2.2	1.6	.002	0.16	.013	.003	.3	.01	.0	.3	liquefied
July	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	638
Aug. 12.....	none	very slight	.3	5.1	1.2	3.9	.0019	.016	.016	.0	.35	.00	.000	.9	.....
Sept. 15.....	none	none	.2	3.8	2.3	1.5	.0015	.014	.014	.000	.6	.00	.00	.8	.....
Oct. 13	none	none	.2	3.9	1.4	2.5	.000	.012	.012	.000	.6	.000	.000	.95	.....
Nov. 23.....	none	none	.4	4.0	2.0	2.0	.000	.010	.010	.000	6.	.00	.000	.8	222
Dec.....	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	.....

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Pettaconsett Pumping Station, collectively, by Months.

(Parts in 100,000.)

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
Jan. 15.....	as usual	as usual	as usual	6.1	4.3	1.8	.004	.016	.015	.001	.52	.013	trace	.5	183
Feb. 24	less than usual	less than usual	as usual	3.3	1.5	1.8	.0	.012	.....	trace	.4	trace	.0	.25	1977*
Mar. 17.....	as usual	as usual	as usual	3.3	1.4	1.9	.002	.018	.011	.002	.4	.015	.000	.3	liquefied
Apr. 14.....	less than usual	less than usual	as usual	3.3	1.1	2.2	.002	.018	.017	.001	.4	trace	trace	.4	560
May 19.....	more than usual	more than usual	more than usual	3.2	1.0	2.2	.04	.02	.018	.002	.425	.015	.005	.5	391
June 16.....	Excessive	Excessive	as usual	5.5	3.0	2.5	.0026	.024	.02	.004	.45	.015	trace	.7	742
July	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	6510
Aug. 12.....	none	organic dirty floc	.4	6.1	2.1	4.0	.0010	.0198	.1920	.0006	.45	.035	trace	1.2	.....
Sept. 15.....	none	consid floc	.2	5.6	2.3	3.3	.00274	.0175	.0165	.001	.6	.02	.000	1.4	.....
Oct. 13.....	none	slight floc	.2	4.6	1.4	3.2	.001	.013	.013	.....	.7	.001	.000	1.1	.....
Nov. 23.....	none	none	.4	4.5	2.0	2.5	.002	.0150	.0135	.0015	.7	.00	.008	1.2	466
Dec.....	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	.....

* After heavy rain.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, collectively, by dates, at different points, 1898.

(Parts in 100,000)

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
JANUARY.														
Hope	less than usual	less than usual	3.6	2.6	1.0	.002	.012	.012	trace	.4	trace	.0	.3	118
Washington	less than usual	less than usual	5.6	3.0	2.6	.0015	.012	.012	trace	.4	trace	.0	.3	307
Pettaconsett	as usual	as usual	6.1	4.3	1.8	.004	.016	.015	.001	.52	.013	trace	.5	188
FEBRUARY.														
Hope	less than usual	as usual	2.8	1.6	1.2	.0	.02	.....	trace	.28	.0	.0	.25	1066*
Washington	less than usual	as usual	3.0	2.0	1.0	.0	.01	.....	trace	.2	.0	.0	.25	1426*
Pettaconsett	less than usual	as usual	3.3	1.5	1.8	.0	.012	.....	trace	.4	trace	.0	.25	1977*
MARCH.														
Hope	less than usual	less than usual	2.9	1.6	1.3	.001	.01	.01	trace	.3	trace	.0	.2	liquefied
Washington	less than usual	less than usual	3.0	1.6	1.4	.0015	.011	.01	.001	.3	trace	.0	.3	liquefied
Pettaconsett	less than usual	less than usual	3.3	1.4	1.9	.002	.013	.011	.002	.4	.015	.000	.3	liquefied

* After heavy rain.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, collectively, by dates, at different points, 1898.—Continued.

(Parts in 100,000.)

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
APRIL.														
Hope	as usual	as usual	3.0	1.5	1.5	.0012	.014	.013	.001	.3	trace	.0	.35	600
Washington	as usual	as usual	3.2	1.2	2.0	.0015	.013	.013	trace	.35	trace	.0	.3	185
Pettaconsett	as usual	as usual	3.3	1.1	2.2	.002	.018	.017	.001	.4	trace	trace	.4	560
MAY.														
Hope	more than usual	as usual	3.0	1.0	2.0	.003	.013	.01	.003	.3	trace	.0	.3	1393
Washington	more than usual	as usual	2.8	1.6	1.2	.004	.012	.01	.002	.35	trace	.0	.3	899
Pettaconsett	more than usual	as usual	3.2	1.0	2.2	.04	.02	.018	.002	.425	.015	.005	.5	891
JUNE.														
Hope	as usual	as usual	3.2	1.6	1.6	.00186	.02	.017	.003	.2	.01	.0	.4	509
Washington	as usual	as usual	3.8	2.2	1.6	.002	.016	.013	.003	.3	.01	.0	.3	liquefied
Pettaconsett	Excessive	as usual	5.5	3.0	2.5	.0026	.024	.02	.004	.45	.015	trace	.7	742

Chemical and Bacteriological Examination of Water from the Pawtuxet River, collectively, by dates, at different points, 1898.—Continued.

(Parts in 100,000.)

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
JULY.														
Hope	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	157
Washington	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	688
Pettaconsett	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	6510
AUGUST.														
Hope	very slight	.6	5.0	1.2	3.8	.0019	.0178	.0178	.0	.4	.000	.000	.8	.....
Washington	very slight	.3	5.1	1.2	3.9	.0019	.016	.016	.0	.35	.00	.000	.9	.....
Pettaconsett	organic dirty floc	.4	6.1	2.1	4.0	.0010	.0198	.0192	.0006	.45	.035	trace	1.2	.....
SEPTEMBER.														
Hope	none	.2	4.6	2.4	2.2	.0015	.0145	.0145	.....	.55	.00	.000	.8	.....
Washington	none	.2	3.8	2.3	1.5	.0015	.014	.014	.000	.6	.00	.000	.8	.....
Pettaconsett	consid floc	.2	5.6	2.3	3.3	.00274	.0175	.0165	.001	.6	.02	.000	1.4	.....

Chemical and Bacteriological Examination of Water from the Pawtuxet River, collectively, by dates, at different points, 1898.—Continued.

(Parts in 100,000.)

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
OCTOBER.														
Hope	none	.2	3.4	1.1	2.3	.000	.012	.012	.000	.6	.000	.000	.90	.....
Washington	none	.2	3.9	1.4	2.5	.000	.012	.012	.000	.6	.000	.000	.95	.....
Pettaconsett	slight floc	.2	4.6	1.4	3.2	.001	.013	.013	.....	.7	.001	.000	1.1	.....
NOVEMBER.														
Hope	none	.4	3.7	1.6	2.1	.000	.009	.009	.000	.6	.00	.000	.8	469
Washington	none	.4	4.0	2.0	2.0	.000	.010	.010	.000	.6	.00	.000	.8	222
Pettaconsett	none	.4	4.5	2.0	2.5	.002	.0150	.0135	.0015	.7	.00	.003	1.2	466
DECEMBER.														
Hope	.....	.....	....	....	...	.....	.....	.....	.....	....	.....	.....	....	499
Washington	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	785
Pettaconsett	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	735

Water Supply of Providence.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, by place, giving averages by years.

(Parts per 100.000.)

YEAR.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
HOPE.												
1894*	5.2	1.2	3.9	.0014	.0012	.0118	.0005	.8	.008	.....	1.19	568
1895	4.7	1.9	2.7	.0019	.0178	.015	.0008	.8	.....	.....	.8	698
1896	4.4	2.7	2.0	.0021	.0177	.016	.0008	.5	.006	.....	.31	3830
1897	3.5	2.2	1.4	.0015	.015	.0145	.0002	.4	.006	.0	.3	329
1898	3.5	1.6	1.9	.0012	.014	.0115	.0007	.4	.000	.0	.51	616
WASHINGTON.												
1894*	4.6	1.5	3.2	.0007	.0131	.0129	.0003	.78	.02	.....	1.24	3970
1895	4.04	1.9	2.14	.0012	.0164	.0145	.0007	.58	.007	.....	.89	560
1896	4.0	2.0	2.0	.0111	.014	.0136	.0007	.5	.012	.....	.325	7678
1897	4.1	2.6	1.6	.0015	.014	.016	.0009	.43	.002	.....	.29	1224
1898	3.8	1.9	2.0	.0014	.013	.011	.001	.4	.000	.000	.52	615
PETTACONSETT.												
1894*	5.7	1.6	4.2	.0015	.0199	.0192	.0006	.67	.02	.001	1.55	9021
1895	5.3	1.9	3.0	.0023	.0081	.0174	.0033	.66	.006	.....	.57	8900
1896	5.6	2.7	3.1	.0043	.0197	.0166	.0029	.57	.013	.....	.53	11479
1897	5.3	2.9	2.4	.0042	.018	.0165	.0018	.52	.023	.....	.6	6564
1898	4.6	2.0	2.5	.0057	.0168	.0143	.0013	.50	.011	.001	.76	1547

* Average of the last six months of the year only.

Water Supply of Providence.

Chemical Examinations of the Pawtuxet River Water, taken at the Pettaconsett Pumping Station, by months, on the first and fifteenth of each month, for the year 1898.

Date.	Total Residue.	Organic and Volatile Matter.	Mineral Matter.	Common Salt.	Albuminoid Ammonia.	Ready-formed Ammonia.	Nitrogen in nitrates.	Nitrogen in nitrites.
January 1	44.	14.	30.	4.14	.28	.06	.60	0
January 15	43.	14.	29.	5.62	.20	.02	.50	0
February 3	36.	14.	22.	4.43	.22	.04	.40	0
February 15	37.	15.	22.	4.14	.16	.02	.60	trace
March 1	32.	13.	19.	2.96	.16	.03	.60	0
March 15	33.	14.	19.	3.25	.14	.03	.50	0
April 1	33.	12.	21.	5.32	.22	.04	.60	0
April 15	35.	15.	20.	4.73	.20	.02	.50	0
May 2	32.	13.	19.	3.99	.18	.03	.40	0
May 16	35.	14.	21.	4.44	.20	.02	.50	0
June 1	48.	24.	24.	4.73	.20	.04	.60	0
June 15	45.	14.	31.	5.91	.28	.02	.50	0
July 1	46.	14.	32.	6.80	.26	.04	.60	0
July 15	41.	18.	23.	4.73	.30	.04	.60	0
August 1	50.	22.	28.	5.32	.26	.03	.60	0
August 15	46.	21.	25.	3.55	.32	.06	.60	0
September 1	50.	22.	28.	3.55	.26	.02	.60	0
September 15	55.	21.	34.	6.21	.28	.03	.60	0
October 1	51.	16.	35.	6.21	.34	.04	.60	0
October 15	50.	19.	31.	6.51	.28	.03	.60	0
November 1	47.	20.	27.	5.32	.26	.04	.60	0
November 15	42.	18.	24.	5.32	.24	.03	.60	0
December 2	40.	15.	25.	4.73	.22	.04	.60	0
December 15	40.	14.	26.	5.02	.18	.02	.60	0
Average for year	42.	17.	26.	4.87	.24	.04	.56	0

Water Supply of Providence.

Chemical Examinations of the Pawtuxet River Water, taken at the Pettaconsett Pumping Station, giving averages, by years, for twenty-three years.

[Parts (in weight) in one million parts of water (in weight).]

Year.	Total Residue.		Mineral Matter.		Organic and Volatile Matter.		Common Salt.		Albuminoid Ammonia.		Ammonia.	
	Average.	Maximum.	Average.	Maximum.	Average.	Maximum.	Average.	Maximum.	Average.	Maximum.	Average.	Maximum.
1876.....	50	62	30	44	20	30	5.72	8.50	.24	.40	.06	.11
1877.....	43	56	24	32	19	24	5.46	7.09	.23	.32	.06	.12
1878.....	37	54	21	34	16	24	5.47	8.51	.17	.25	.04	.10
1879.....	38	59	24	43	14	24	5.73	10.83	.17	.23	.05	.10
1880.....	45	70	29	49	16	22	6.35	8.76	.22	.26	.02	.14
1881.....	41	55	26	40	15	21	4.95	8.07	.21	.28	.02	.05
1882.....	43	59	27	42	16	25	4.43	6.60	.25	.38	.03	.08
1883.....	47	64	30	47	17	24	4.60	7.95	.27	.36	.04	.14
1884.....	45	72	29	43	16	29	4.79	7.33	.19	.32	.04	.14
1885.....	46	63	30	46	16	24	4.20	6.74	.22	.30	.05	.20?
1886.....	46	59	29	44	17	25	4.14	5.95	.22	.30	.05	.14
1887.....	42	63	24	40	18	25	4.18	6.84	.21	.36	.04	.10
1888.....	41	59	24	40	17	30	3.49	5.62	.20	.30	.05	.14
1889.....	38	52	22	29	17	27	2.86	4.99	.21	.30	.04	.10
1890.....	41	55	24	35	17	25	3.63	5.30	.24	.36	.04	.12
1891.....	51	107	32	74	19	33	3.99	6.52	.23	.38	.04	.14
1892.....	48	71	29	49	19	29	5.22	8.48	.29	.46	.07	.20
1893.....	46	66	29	46	17	22	5.27	8.89	.26	.34	.05	.12
1894.....	49	75	31	52	18	24	5.72	8.90	.27	.46	.04	.18
1895.....	46	61	29	39	18	27	5.73	8.45	.30	.48	.09	.34
1896.....	44	57	27	36	18	25	5.51	7.71	.28	.46	.08	.20
1897.....	46	61	27	40	19	28+	5.33	8.60	.27	.36	.05	.16
1898.....	42	55	26	35	17	24	4.87	6.80	.24	.34	.04	.08
Average.....	44	..	28	..	17	..	4.85	..	25	..	.05	..
Maximum	..	107	..	74	..	33	..	10.83	..	.48	..	.34

Chemical and Bacteriological Examination of Water from the Blackstone River, at Albion Village, collectively, by Months, 1898.

(Parts in 100,000.)

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
Jan. 14.....	as usual	as usual	as usual	10.0	4.0	6.0	.054	.028	.026	.002	.72	.0375	.005	1.3	.....
Feb. 25*....	less than usual	less than usual	less than usual	5.0	2.7	2.3	.008	.012	.012	trace	.44	trace	trace	.5	.....
Mar. 18.....	as usual	as usual	as usual	6.0	2.5	3.5	.003	.012	.01	.002	.55	.04	trace	.7	.....
Apr. 15.....	as usual	as usual	as usual	6.4	2.0	4.4	.006	.019	.017	.002	.6	.035	trace	1.2	.....
May 20.....	as usual	as usual	as usual	6.7	3.5	3.2	trace	.016	.013	.003	.6	.025	trace	1.3	.....
June 17.....	more than usual	more than usual	as usual	6.8	3.0	3.8	.0186	.036	.026	.01	.65	.06	.005	2.0	.....
July	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	.....
Aug. 13.....	none	consid floc	.4	9.3	1.2	8.1	.0048	.0236	.0198	.0088	.8	.075	.0028	1.8	.....
Sept. 16.....	none	very slight	.2	8.3	3.2	5.1	.0028	.018	.018	.00	.9	.035	trace	1.7	.....
Oct. 14.....	none	slight	.2	7.4	1.4	6.0	.0021	.021	.020	.001	1.1	.006	.0005	1.6	.....
Nov. 24.....	none	slight floc	.4	5.0	1.8	3.2	.0008	.008	.008	.000	.7	.05	.0002	1.6	.....
Dec.....	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	2400

* After heavy rain.

Chemical and Bacteriological Examination of Water from the Blackstone River, at Valley Falls Village, collectively, by Months, 1898.

(Parts in 100,000.)

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
Jan. 14.....	as usual	as usual	as usual	10.1	3.5	6.6	.04	.028	.026	.002	.75	.04	.005	1.8	.....
Feb. 25*.....	less than usual	less than usual	less than usual	5.0	2.7	2.3	.008	.014	.014	trace	.44	trace	trace	.5	.....
Mar. 18.....	less than usual	less than usual	as usual	6.2	2.8	3.4	.003	.016	.014	.002	.56	.04	trace	.7	.....
Apr. 15	as usual	as usual	as usual	7.2	2.6	4.6	.006	.02	.017	.003	.65	.001	.04	1.3	.....
May 20.....	as usual	as usual	as usual	6.7	2.5	4.2	trace	.016	.013	.003	.6	.02	trace	1.3	.....
June 17.....	as usual	as usual	as usual	7.1	3.1	4.0	.0134	.028	.016	.012	.65	.07	.0035	2.0	.....
July	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	.....
Aug. 13.....	none	floc rusty	.4	8.6	1.4	7.2	.0064	.0204	.019	.0014	.8	.07	.0042	1.7	.....
Sept. 16.....	none	large amt floc	.2	8.2	2.4	5.8	.003	.019	.0186	.0004	1.0	.05	.001	1.6	.....
Oct. 14.....	none	very slight	.2	7.2	1.6	5.6	.002	.018	.018	.000	1.0	.005	.0005	1.7	.....
Nov. 24.....	none	very slight	.4	5.7	1.8	3.9	.005	.0155	.0155	.0000	.6	.05	.0001	1.7	.....
Dec.....	.....	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	2165

*After heavy rain.

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, by dates, at different points, 1898.

(Parts in 100,000.)

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
JANUARY.														
Albion.....	as usual	as usual	10.0	4.0	6.0	.054	.028	.026	.002	.72	.0375	.005	1.3	.....
Valley Falls...	as usual	as usual	10.1	3.5	6.6	.04	.028	.026	.002	.75	.04	.005	1.8	.....
FEBRUARY.														
Albion*.....	less than usual	less than usual	5.0	2.7	2.3	.008	.012	.012	trace	.44	trace	trace	.5	.....
Valley Falls*..	less than usual	less than usual	5.0	2.7	2.3	.008	.014	.014	trace	.44	trace	trace	.5	.....
MARCH.														
Albion.....	as usual	as usual	6.0	2.5	3.5	.003	.012	.01	.002	.55	.04	trace	.7	.....
Valley Falls...	less than usual	less than usual	6.2	2.8	3.4	.003	.016	.014	.002	.56	.04	trace	.7	.....

*After heavy rain.

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, by dates, at different points, 1898.—Continued.

(Parts in 100,000.)

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
APRIL.														
Albion.....	as usual	as usual	6.4	2.0	4.4	.006	.019	.017	.002	.6	.085	trace	1.2	.....
Valley Falls...	as usual	as usual	7.2	2.6	4.6	.006	.02	.017	.003	.65	.001	.04	1.3	.....
MAY.														
Albion.....	as usual	as usual	6.7	3.5	3.2	trace	.016	.013	.003	.6	.025	trace	1.3	.....
Valley Falls...	as usual	as usual	6.7	2.5	4.2	trace	.016	.013	.003	.6	.02	trace	1.3	.....
JUNE.														
Albion.....	more than usual	as usual	6.8	3.0	3.8	.0186	.036	.026	.01	.65	.06	.005	2.0	.....
Valley Falls...	high	as usual	7.1	3.1	4.0	.0134	.028	.016	.012	.65	.07	.0035	2.0	.....

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, by dates, at different points, 1898.—Continued.

(Parts in 100,000.)

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. In Solution.	Albuminoid. In Suspension.		As Nitrates.	As Nitrites.		
JULY.														
Albion														
Valley Falls														
AUGUST.														
Albion	consid floc	.4	9.3	1.2	8.1	.0048	.0236	.0198	.0038	.8	.075	.0028	1.8	
Valley Falls	floc rusty	.4	8.6	1.4	7.2	.0064	.0204	.0190	.0014	.8	.07	.0042	1.7	
SEPTEMBER.														
Albion	very slight	.2	8.3	3.2	5.1	.0028	.018	.018	.00	.9	.035	trace	1.7	
Valley Falls	large amt floc	.2	8.2	2.4	5.8	.008	.019	.0186	.0004	1.0	.05	.001	1.6	

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, by dates, at different points, 1898.—Continued.

(Parts in 100,000.)

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	Bacteria per c. c.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		As Nitrates.	As Nitrites.		
OCTOBER.														
Albion.....	slight	.2	7.4	1.4	6.0	.0021	.021	.020	.001	1.1	.006	.0005	1.6	.....
Valley Falls...	very slight	.2	7.2	1.6	5.6	.002	.018	.018	.000	1.0	.005	.0005	1.7	.....
NOVEMBER.														
Albion.....	slight floc	.4	5.0	1.8	3.2	.0003	.003	.003	.000	.7	.05	.0002	1.6	.....
Valley Falls...	very slight	.4	5.7	1.8	3.9	.005	.0155	.0155	.0000	.6	.05	.0001	1.7	.....
DECEMBER.														
Albion.....	.....	.....	....	....	...	.....	.....	.....	.....	....	.....	.....	....	2400
Valley Falls...	.....	.....	....	....	....	.....	.....	.....	.....	....	.....	.....	....	2165

Average of Chemical and Bacteriological Examination of Water from the Blackstone River, at Albion, for five years.

(Parts per 100,000.)

YEAR.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid.				As Nitrates.	As Nitrites.		
					Total.	Dissolved.	Suspended.					
1894	7.5	1.6	5.9	.0156	.0235	.0227	.0008	1.1	.08	.004	2.17	6389
1895	8.1	2.8	5.3	.0127	.026	.0206	.0027	1.05	.056	.....	2.13	4175
1896	7.2	3.1	4.9	.0204	.022	.019	.0027	.09	.078	.003	1.6	7721
1897	7.5	3.2	4.2	.0223	.022	.0194	.0027	.77	.065	.003	1.4	36955
1898	7.1	2.5	4.6	.0100	.0189	.0165	.0024	.71	.036	.0014	1.3	.....

Average of Chemical and Bacteriological Examination of Water from the Blackstone River, at Valley Falls, for five years.

(Parts per 100,000).

YEAR.	Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid.				As Nitrates.	As Nitrites.		
					Total.	Dissolved.	Suspended.					
1894	6.65	2.05	7.2	.0117	.0261	.0228	.0034	1.2	.824	.007	1.76	6951
1895	6.9	2.9	4.8	.0139	.0201	.0147	.0032	1.08	.05	.007	2.24	4711
1896	8.5	3.6	4.9	.0196	.02	.0172	.0028	.09	.007	.007	1.60	3763
1897	7.4	3.3	4.1	.0215	.022	.0183	.003	.08	.07	.004	1.5	7369
1898	7.2	2.4	4.8	.0087	.019	.017	.0024	.71	.03	.0014	1.4	.....

METEOROLOGY.

It has been remarked in previous reports of the Board that the influence of the meteorological conditions of the atmosphere, as well as the floating matter suspended therein, are recognized and acknowledged by all pathologists as causes of disease; and the following tables are therefore introduced, as heretofore, for the purpose of comparing the large prevalence of certain diseases, at different monthly periods of the year, with the temperature, the atmospheric pressure, the relative humidity, prevailing direction and force of the wind, and other conditions of the atmosphere, and also the amount of cloud and rain-fall during each month of the year. All of the said diseases and monthly prevalence of the same may be found in the report upon the registration of deaths arranged by MONTHS, in Table VII of the Registration Report.

The first table is compiled from the monthly reports of the city engineer of Providence, and shows the mean, maximum, and minimum temperature of the different months, and the extremes and average daily range of the same; the rain-fall, and prevailing direction of the wind.

The second table will give a more comprehensive monthly summary of observations during 1898, including a large number of atmospheric conditions for each month, and also yearly summaries for each of the fourteen preceding years.

It is condensed from the annual summary of monthly observations at Hope reservoir and the city hall, in Providence.

TABLE I.

Temperature, Range of Temperature, Rain-fall, and Prevailing Direction of the Wind for each Month during the year 1898.

MONTHS, 1898.	TEMPERATURE.							Total Amount of Rain or Melted Snow in Inches.	PREVAILING DIRECTION OF THE WIND.
	Monthly Mean.	Maximum.	Minimum.	Monthly Range.	Greatest Daily Range.	Least Daily Range.	Average Daily Range.		
January.....	30.1	55.	1.	54.	31.5	7.	15.	6.01	N.W.
February.....	32.7	54.	0.	54.	32.	2.5	15.6	6.45	N.W.
March.....	43.3	64.	26.5	37.5	26.	4.5	16.3	2.95	S.
April	45.2	73.5	25.5	48.	24.5	4.	14.9	6.08	N.W.
May	57.8	78.5	37.5	41.	27.5	5.	16.8	4.07	S.
June.....	68.5	92.	50.	42.	27.5	2.	17.8	1.16	S.
July.....	74.	101.5	56.5	45.	29.5	3.5	18.7	10.26	S.
August	74.3	93.	54.	39.	27.	4.	17.6	6.00	S.W.
September.....	66.8	94.5	43.5	51.	27.	10.5	18.7	2.26	N.W.
October.....	55.2	82.5	35.5	47.	24.	4.5	14.4	8.43	S.
November.....	41.7	60.	24.	36.	24.	3.5	12.7	7.29	N.W.
December.....	32.3	49.5	2.	47.5	31.5	5.5	13.	2.54	W.
For year.....	51.8	74.8	29.7	45.2	.....	.....	.....	63.50	N.W. & S.

TABLE II.—*Summary of Meteorological Observations at Hope Reservoir and City Hall, for the year 1898.*

MONTHS.	BAROMETER. Reduced to Sea Level and to 32°.			THERMOMETERS.				RELATIVE HUMIDITY.	WIND.										WEATHER.						RAIN AND SNOW.	
									Prevailing Direction. No. of Days it was									Mean Velocity.	Atmosphere. No. of Days it was					Mean Amount of Cloud.	Amount of Rain or Melted Snow in inches.	Depth of Snow in inches.
	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Variable.		Clear.	Fair.	Variable.	Rain or Snow.	All others.			
January	30.54	28.85	1.69	30.1	55.	1.	54.	69	7	0	1	2	2	1	1	11	6	8	5	7	3	15	1	5.0	6.01†	20.00
February	30.61	28.67	1.94	32.7	54.	0.	54.	74	3	2	0	3	3	3	0	8	6	7	5	9	2	12	0	5.2	6.45†	11.50
March	30.75	29.57	1.18	43.3	64.	26.5	37.5	71	4	1	0	3	5	2	1	4	11	8	5	12	0	14	0	5.0	2.95†	7.00
April	30.31	29.41	.90	45.2	73.5	25.5	48.	65	6	6	0	0	1	1	0	10	6	10	2	9	0	18	1	5.9	6.06†	3.00
May	30.34	29.57	.77	57.8	85.	37.5	47.5	71	2	6	1	2	9	2	0	3	6	8	1	9	1	20	0	6.0	4.07	.....
June	30.33	29.43	.90	68.5	92.	50.	42.	68	4	5	1	1	6	5	2	2	4	8	0	18	0	12	0	5.0	1.16	.....
July	30.42	29.63	.79	74.	101.5	56.5	45.	73	4	2	1	2	6	3	3	3	7	7	4	15	0	12	0	5.1	10.26	.....
August	30.25	29.67	.58	74.3	93.	54.	39.	75	2	1	1	1	3	7	4	4	8	5	1	13	2	14	1	5.5	6.00	.....
September	30.40	29.51	.89	66.8	94.5	43.5	51.	73	3	1	0	0	2	5	0	10	9	7	5	13	1	10	1	4.2	2.26	.....
October	30.43	29.40	1.03	55.2	82.5	35.5	47.	77	3	2	1	1	6	3	3	8	4	7	5	13	1	12	0	4.9	8.43	.. ...
November	30.49	29.09	1.40	41.7	60.	24.	36.	76	6	3	0	2	1	3	2	8	5	9	6	7	1	15	1	4.9	7.29†	20.00
December	30.50	29.25	1.25	32.3	54.	2.	52.	71	5	2	0	0	0	6	10	5	3	8	8	11	1	10	1	4.9	2.54†	4.00
Means for the year	.....	.....	1.11	51.8	.....	.....	46.1	72	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	.....	.....	.....	.....	.....	5.1	.....	.....
Totals for the year	.....	.....	.....	.....	.....	.....	.....	.....	49	31	6	17	44	41	26	76	75	.....	47	136	12	164	6	.....	63.50	65.50
Extremes	30.75	28.67	2.08	.....	101.5	0.	101.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

† Snow and rain.

TABLE II.—Continued.—*Summary of Meteorological Observations at Hope Reservoir and City Hall.*

	Barometer. Reduced to Sea Level and to 32°.			Thermometers.				Relative Humidity.	Wind.										Weather.						Rain and Snow.	
									Prevailing Direction. No. of Days it was									Mean Velocity.	Atmosphere. No. of Days it was					Mean Amount of Cloud.	Amount of Rain or Melted Snow in inches.	Depth of Snow in inches.
	Maximum.	Minimum	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Variable.		Clear.	Fair.	Variable.	Rain or Snow.	All others.			
YEARLY SUMMARY FOR 1897.																										
Means for the year.	.....	.....	1.12	50.8	.....	.....	46.5	70	....	....	....	....	....	....	....	....	....	8	....	....	....	....	....	4.8	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	..	.....	52	23	7	7	52	89	27	89	69	....	68	125	7	160	5	....	47.63	52.50
Extremes	30.84	28.98	1.86	....	95.	.5	89.5	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....
YEARLY SUMMARY FOR 1896.																										
Means for the year.	.....	.....	1.09	50.4	.....	.....	49.	69	....	....	....	....	....	....	....	....	....	9	....	....	....	....	....	4.8	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	59	22	11	18	34	86	81	73	82	....	47	150	10	152	7	....	45.91	61.50
Extremes	30.85	28.87	1.98	.....	98.	—9.	107.	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....
YEARLY SUMMARY FOR 1895.																										
Means for the year.	.....	.....	1.17	51.	.....	.....	45.5	70	....	....	....	....	....	....	....	....	....	8	....	....	....	....	....	4.7	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	64	16	7	18	54	84	40	70	62	....	43	143	18	155	6	....	50.81	80.75
Extremes	30.75	28.61	2.14	.....	98.	—5.	103.	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

YEARLY SUMMARY FOR 1894.

Means for the year.	.....	.....	1.06	51.4	.....	.....	45.4	73	....	....	....	....	...	...	....	....	....	8	....	....	....	....	....	4.9	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	51	20	15	10	54	45	86	61	73	...	46	134	14	153	18	....	42.27	77.00
Extremes.....	30.78	28.78	2.00	.....	97.	—4.	101.	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

YEARLY SUMMARY FOR 1893.

Means for the year.	.....	.....	1.13	48.6	.....	.....	44.8	73	....	....	....	....	....	....	....	....	....	9	....	....	....	....	....	4.8	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	57	15	9	13	45	32	33	72	89	....	53	138	5	166	3	....	51.28	80.50
Extremes.....	30.81	28.84	1.97	.....	95.5	0.	95.5	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

YEARLY SUMMARY FOR 1892.

Means for the year.	....	.....	1.06	50.4	.....	.....	43.3	71	....	....	....	....	....	....	....	....	....	8	..	....	....	....	....	4.9	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	50	19	8	10	41	38	52	75	73	....	47	147	9	156	7	....	37.39	43.00
Extremes.....	30.65	28.99	1.66	.....	96.	2.	94.	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

YEARLY SUMMARY FOR 1891.

Means for the year.	.....	.....	1.10	51.7	.....	.....	46.8	74	....	....	....	....	....	....	....	....	...	8	....	...	....	....	....	5.1	.....	.....
Totals for the year.	.....	.....	.....	.....	...	.....	.....	.....	46	24	8	11	63	40	26	73	74	....	37	158	7	158	5	....	53.19	31.25
Extremes.....	30.78	28.81	1.97	.....	98.	6.	92.	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

The force of the wind and amount of cloud are closely approximated in figures from 0 to 10.

TABLE II.—Continued.—*Summary of Meteorological Observations at Hope Reservoir and City Hall.*

	Barometer. Reduced to Sea Level and to 32°.			Thermometers.				Relative Humidity.	Wind, Prevailing Direction. No. of Days it was									Wind,	Weather. Atmosphere. No. of Days it was						Rain and Snow.	
	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Variable.	Mean Velocity.	Clear.	Fair.	Variable.	Rain or Snow.	All others.	Mean Amount of Cloud.	Amount of Rain or Melted Snow in inches.	Depth of Snow in inches.
YEARLY SUMMARY FOR 1890.																										
Means for the year	.....	.....	1.00	50.4	.....	.....	45.4	74	....	....	....	....	....	....	....	....	....	9	....	....	....	....	....	5.4	.....	.....
Totals for the year	.....	.....	.....	.....	.....	.....	.....	.....	52	15	6	13	47	32	43	79	78	....	97	151	7	168	2	....	50.60	42.00
Extremes	30.88	29.23	1.65	.....	96.	5.5	90.5	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	.....
YEARLY SUMMARY FOR 1889.																										
Means for the year	.....	.....	1.15	51.4	.....	.....	42.3	76	....	....	....	....	....	....	....	. .	....	8	....	....	....	....	....	5.4	.....	.....
Totals for the year	.....	.....	.....	.....	.....	.....	.....	.....	56	31	9	7	61	39	37	71	54	....	40	142	9	166	8	....	55.91	17.75
Extremes	30.90	28.93	1.97	.....	92.5	0.5	92.	... .	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....
YEARLY SUMMARY FOR 1888.																										
Means for the year	.....	.....	1.21	48.2	.. ..	.....	46.5	72	....	..	....	....	....	....	....	....	....	9	....	....	....	....	....	5.2	.....	.....
Totals for the year	.....	.....	.....	.....	.....	.....	.....	.....	54	17	9	11	41	33	34	97	70	....	54	137	8	167	5	....	63.44	31.50
Extremes	30.82	28.75	2.07	.....	96.5	—5.	101.5	.....	....	...	....	....	....	....	....	...	....	....	....	....	....	....	....	....	.....	.....	.....

YEARLY SUMMARY FOR 1887.

Means for the year.	.....	.....	1.26	49.4	.....	.....	47.	73	....	....	....	....	...	....	....	....	....	8	....	....	...	....	....	5.2	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	68	22	7	14	45	38	26	77	73	....	35	147	14	154	15	....	50.98	54.00
Extremes.....	30.97	28.94	2.03	.....	94.	—1.5	95.5	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

YEARLY SUMMARY FOR 1886.

Means for the year.	.....	.....	1.13	48.8	.....	.....	46.8	74	....	....	....	....	....	....	....	....	....	8	....	....	....	....	....	5.0	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	51	27	12	7	56	30	39	69	74	....	34	143	18	160	10	....	52.02	54.50
Extremes.....	30.80	28.69	2.11	.....	95.5	—5.5	101.	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

YEARLY SUMMARY FOR 1885.

Means for the year.	.....	.....	1.09	48.7	.....	.....	46.6	71	....	....	....	....	....	....	....	....	....	9	....	....	....	....	....	4.6	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	46	21	8	14	56	43	42	74	61	....	45	157	17	142	4	....	39.70	27.25
Extremes.....	30.82	28.99	1.83	.....	93.5	—1.	94.5	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

YEARLY SUMMARY FOR 1884.

Means for the year.	.....	.....	1.05	49.5	.....	.....	49.2	76	....	....	....	....	....	....	....	....	....	9	....	....	....	....	....	5.3	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	57	22	8	14	42	60	27	68	73	....	36	127	26	166	11	....	48.76	44.50
Extremes.....	30.79	28.93	1.86	.....	94.	—10.	104.	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

The force of the wind and amount of cloud are closely approximated in figures from 0 to 10.

TABLE II.—Continued.—*Summary of Meteorological Observations at Hope Reservoir and City Hall.*

	Barometer. Reduced to Sea Level and to 32°.			Thermometers.				Relative Humidity.	Wind. Prevailing Direction. No. of Days it was									Wind.	Weather. Atmosphere. No. of Days it was						Rain and Snow.	
	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Variable.	Mean Velocity.	Clear.	Fair.	Variable.	Rain or Snow.	All others.	Mean Amount of Cloud.	Amount of Rain or Melted Snow in inches.	Depth of Snow in inches.
YEARLY SUMMARY FOR 1883.																		Mean Force.								
Means for the year.	.....	.....	1.08	48.2	.....	.....	45.5	72	....	....	....	....	....	....	....	....	....	2.2	....	....	....	....	....	5.1	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	43	31	7	11	44	51	85	70	73	....	45	136	17	156	11	....	39.54	78.00
Extremes.....	30.77	28.88	1.89	.....	93.	—9.5	102.5	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....
YEARLY SUMMARY FOR 1882.																										
Means for the year.	.....	.....	1.03	49.2	.....	.....	46.	72	....	....	....	....	....	....	....	....	....	2.2	....	....	....	....	....	5.8	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	54	26	2	16	36	39	40	82	60	....	44	148	31	136	6	....	44.96	74.00
Extremes.....	30.79	29.22	1.57	.....	95.	—11.	106.	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....
YEARLY SUMMARY FOR 1881.																										
Means for the year.	.....	.....	1.08	49.6	.....	.....	44.5	73	....	....	....	....	....	....	....	....	....	2.15	....	....	....	....	....	5.1	.....	.....
Totals for the year.	.....	.....	.....	.....	.....	.....	.....	.....	47	33	12	9	50	47	20	80	67	....	80	73	54	130	28	....	44.79	27.50
Extremes.....	30.80	28.97	1.83	.....	96.	—4.	100.	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....

The force of the wind and amount of cloud are closely approximated in figures from 0 to 10.

The rain-fall observations previous to 1886 have been corrected for an inaccuracy caused by the imperfect construction of the gauges with which they were made.

Condensed Table of Meteorological Observations in Rhode Island, 1881–1898.

YEARS.	Barometer Reduced to Sea Level and to 32° F.				Thermometers.				Mean Humidity.	Precipitation.		Prevailing Direction of Wind.
	Mean Barometer.	Highest Barometer.	Lowest Barometer.	Mean Range of Barometric Pressure.	Mean.	Maximum.	Minimum.	Mean Range.		Rain and Melted Snow in Inches.	Number of Days Snow or Rain fell.	
1898	29.99	30.75	28.67	1.11	51.8	101.5	0.0	46.1	72	63.50	164	N. W.
1897	29.99	30.84	28.98	1.12	50.8	95.0	5.5	46.5	70	47.63	160	N. W.
1896	29.99	30.85	28.87	1.17	50.4	98.0	—9.0	49.0	69	45.91	152	N. W.
1895	29.98	30.75	28.61	1.17	51.0	98.0	—5.0	45.5	70	50.81	155	N. W.
1894	30.01	30.78	28.78	1.06	51.4	97.0	—4.0	45.4	73	42.27	153	Variable.
1893	29.98	30.81	28.84	1.13	48.6	95.5	0.0	44.8	73	51.28	151	N. W.
1892	29.98	30.65	28.99	1.66	50.4	96.0	2.0	43.3	71	37.39	156	N. W.
1891	30.02	30.78	28.81	1.10	51.7	98.0	6.0	46.8	74	53.19	158	N. W.
1890	30.00	30.88	29.23	1.00	50.4	96.0	5.5	45.4	74	50.60	168	N. W.
1889	29.99	30.90	28.93	1.15	51.4	92.5	0.5	42.3	76	55.91	166	N. W.
1888	30.00	30.82	28.75	1.21	48.2	96.5	—5.0	46.5	72	63.44	167	N. W.
1887	30.01	30.97	28.94	1.26	49.4	94.0	—1.5	47.0	73	50.98	154	N. W.
1886	30.01	30.80	28.69	1.13	48.8	95.5	—5.5	46.8	74	52.02	160	Variable.
1885	29.98	30.82	28.99	1.09	48.7	93.5	—1.0	46.6	71	39.70	142	N. W.
1884	30.01	30.79	28.93	1.05	49.5	94.0	—10.0	49.2	76	48.76	166	Variable.
1883	30.05	30.77	28.88	1.08	48.2	93.0	—9.5	45.5	72	39.54	156	Variable.
1882	30.03	30.77	29.22	1.03	49.2	95.0	—11.0	46.0	72	44.96	136	N. W.
1881	30.00	30.80	28.97	1.03	49.6	96.0	—4.0	44.5	73	44.79	130	N. W.

Meteorological Observations for the Whole State for 1898.

Compiled from the Bulletin of the New England Weather Service.

MONTHS.	TEMPERATURE (IN DEGREES FAHRENHEIT).							PRECIPITATION (IN INCHES).					SKY.			WIND.
	Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snow-fall (unmelted).	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of wind.
BLOCK ISLAND.																
January	32.2	+1.0	54	28	6	30	22	5.42	+1.17	1.10	2	11	7	18	6	N. W.
February	33.3	+1.6	51	12	5	2	19	5.20	+0.76	2.20	5	12	12	10	6	N. W.
March	39.8	+5.2	56	20	27	1	14	3.89	−0.13	0.88	6	11	8	17	6	S. E.
April	48.0	−1.0	68	18	26	4	21	5.66	+2.22	1.21	5	17	8	13	9	N. E.
May	51.4	−1.1	73	20	35	9	20	6.54	+2.47	1.86	.....	18	5	14	12	S. W.
June	60.6	−1.6	78	13	46	6	21	0.92	−1.63	0.56	.....	11	11	14	5	S. W.
July	67.6	−0.7	83	1	54	7	22	7.87	+4.38	6.22	.....	10	15	6	10	S. W.
August	69.6	+1.6	81	31	59	27	15	7.69	+4.19	2.70	.....	15	10	14	7	S. W.
September	64.9	+1.2	84	1	49	25	15	0.96	−1.96	0.35	.....	6	18	6	6	S. W.
October	55.2	+1.4	74	1	40	28	16	7.18	+2.75	1.90	.....	12	14	6	11	S. W.

November	43.6	−1.6	61	6	27	25	22	7.55	+3.35	2.04	8	13	13	6	11	N. W.
December	34.6	−2.1	53	5	8	14	30	3.22	−0.86	1.99	2	9	10	11	10	N. W.
Means	49.7															
Totals								62.10			28	145	131	135	109	
Extremes			84		5		30			6.22						S. W.

BRISTOL.

January	29.4		53	18	2	30	26	5.13		1.27	8	11	14	8	9	
February	32.0		48	10	4	2	30	6.60		2.75	8	10	14	5	9	
March	40.7		57	20	24	1	22	3.37		0.77	5	10	13	8	10	
April	44.0		65	30	25	4	28	4.94		2.42	4	15	12	8	15	
May	54.5		78	20	35	10	28	4.71		1.30	1	14	8	9	14	
June	64.0		84	26	47	6	22	1.29		0.95		7	16	7	7	
July																
August	71.4		84	2	53	28	18	6.29				12	12	13	6	
September	65.6		89	3	46	21	21	1.58		1.81		6	15	7	8	
October	54.8		74	*1	35	18	19	9.47		2.77		11				
November	42.4		59	6	24	*27	21	7.31		1.88	21	14	16	4	10	N. W.
December	32.5		47	*5	6	14	29	1.89		0.89	4	9	16	5	10	W.
Means	47.4															
Totals								52.58			51	119	136	69	98	
Extremes			89		2		30			2.77						

*On other dates also.

Meteorological Observations for the Whole State for 1897.

(CONTINUED.)

MONTHS.	TEMPERATURE (IN DEGREES FAHRENHEIT).							PRECIPITATION (IN INCHES).					SKY.			WIND.
	Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snow-fall (unmelted).	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of the wind.
KINGSTON.																
January	28.0	+0.9	54	13	0	30	28	6.83	+1.28	1.92	15	11	7	14	10	W.
February	30.0	+3.0	52	10	−2	2	33	8.13	+3.09	4.90	7	12	11	8	9	W.
March,	40.1	+5.9	61	20	22	*1	27	3.71	−1.21	0.68	10	11	9	11	11	E.
April	42.6	−2.1	71	17	17	4	33	5.56	+0.78	2.18	5	11	5	9	16	W.
May	53.7	−0.8	83	20	33	8	28	8.95	+4.51	1.67	1	15	5	9	17	N. E.
June	64.1	−0.9	88	26	43	16	29	0.77	−1.55	0.21	.....	11	8	13	9	S. W.
July	70.0	+1.2	95	3	50	11	34	7.11	+4.56	5.50	.....	10	9	7	15	S. W.
August	71.0	+2.4	88	31	49	28	29	6.85	+3.51	2.14	.....	13	9	16	6	S. W.
September	64.4	+1.9	92	1	38	21	30	2.11	−0.63	1.41	.....	7	14	5	11	S. W.
October	52.7	+2.5	80	1	30	28	28	12.05	+6.51	3.45	.....	11	12	6	13	W.

November	40.2	+0.3	60	*2	18	26	27	7.44	+2.90	1.95	20	12	9	7	14	S. W.
December	29.4	−2.9	50	30	−4	14	35	2.71	−1.20	1.05	2	8	12	9	10	W.
Means	48.9															
Totals								72.23			60	132	110	114	141	
Extremes			95		−4		35			5.50						W.&S.W.

NARRAGANSETT PIER.

January	29.8		52	*20	0	30	30	4.98		1.70	4	9	16	4	11	N. W.
February	30.8		51	10	0	2	34	7.42		3.20	12	9	15	4	9	S.
March	40.5		61	20	23	1	23	3.75		1.29	6	14	17	1	13	S.
April	43.2		66	30	20	4	28	5.13		2.00	3	12	13	2	15	N. E.
May	53.9		83	20	32	10	28	8.96		2.65		16	15	3	13	S.
June	64.0		85	26	47	16	24	0.10		0.05		5	20	3	7	W.
July	70.1		88	3	52	*11	25	3.40		2.00		9	19	2	10	S. W.
August	71.1		85	*31	53	28	23	3.72		2.00		8	22	4	5	S. W.
September	64.7		90	*1	39	21	29	1.99		1.16		7	23	3	4	W.
October	54.0		75	4	30	28	25	9.16		2.55		13	16	1	14	N. W.
November	40.6		60	*6	19	26	33	6.84		2.01	18	13	16	2	12	N. W.
December	31.7		50	*5	−1	14	35	2.61		1.46	1	8	16	2	13	N. W.
Means	49.5															
Totals								59.01			44	123	208	31	126	
Extremes			90		−1		35			3.20						N. W.

*On other dates also.

Meteorological Observations for the Whole State for 1898.

(CONTINUED.)

MONTHS.	TEMPERATURE (IN DEGREES FAHRENHEIT).							PRECIPITATION (IN INCHES).					SKY.			WIND.
	Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snow-fall (unmelted).	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.	Prevailing direction of wind.
PROVIDENCE.																
January	30.0	+1.4	55	13	1	32	32	6.01	+1.98	2.00	20	11	.....	.....	.....	N. W.
February	32.9	+5.4	54	10	0	4	28	6.45	+2.78	.....	12	9	.....	.....	.....	.....
March	44.2	+10.0	64	13	26	*1	26	2.95	−1.68	0.70	7	12	.....	.....	.....	.....
April	45.4	−0.1	74	17	26	*3	25	6.08	+2.88	.....	3	14	.....	.....	.....	.....
May	58.8	.....	85	20	38	10	27	4.07	+0.34	.....	.....	13	.....	.....	.....	.....
June	60.8	.....	92	26	50	16	28	1.16	−1.07	0.56	.....	5	.....	.....	.....	.....
July	75.4	+3.0	102	3	56	11	30	10.26	+7.04	4.80	.....	9	.....	.....	.....	.....
August	75.2	+3.8	93	*4	54	28	27	6.00	+1.80	2.47	.....	9	.....	.....	.....	.....
September	68.0	+5.6	94	2	44	21	27	2.26	−0.83	1.69	.....	9	.....	.....	.....	.....
October	55.1	+2.9	82	4	36	*18	24	8.43	+4.65	2.18	.....	10	.....	.....	.....	.....

November	41.8	+1.6	60	*2	24	*26	21	7.29	+3.16	1.53	20	11	.....	.....	.....	.....
December	32.5	−1.5	54	30	2	14	31	2.54	−1.35	0.76	4	7	.....	.....	.....	.....
Means	51.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	.....	.....	.....	.....	.....	.....	.....	63.50	.....	.....	66	119	.....	.....	.....	.....
Extremes	.....	.....	102	.....	0	.....	32	.....	.....	4.80	.....	.....	.....	.....	.....	.....

AVERAGES, ETC., FOR 1898.

Block Island	49.7	.....	84	.....	5	.....	30	62.10	.....	6.22	28	145	131	135	109	S. W.
Bristol	47.4	.....	89	.....	2	.....	30	52.58	.....	2.77	51	119	136	69	98	.....
Kingston	48.9	.....	95	.....	−4	.....	35	72.22	.....	5.50	60	132	110	114	141	W.&S.W.
Narragansett Pier	49.5	.....	90	.....	−1	.....	35	59.01	.....	3.20	44	123	208	31	126	N. W.
Providence	51.7	.....	102	.....	0	.....	32	63.50	.....	4.80	66	119	.....	.....	.....	.....

*On other dates also.

BIRTHS, DEATHS, AND MARRIAGES, 1898.

The value of reliable reports in their various bearings, relating to the records of births, marriages, and deaths, and the items of fact connected therewith, showing the vital movements of the population from year to year, has been so frequently presented in the previous reports of this Board as to need no repetition at this time. It is gratifying, however, to be able to state that, with no exception, persons eminent in social and political science everywhere recognize the indispensable information such reports furnish, and that in every civilized country they occupy places of importance in the government reports scarcely second to any other department.

The fourty-fifth report on the registry of vital movements in Rhode Island was completed and issued by the end of the year, and will be found appended to this report.

The work of collecting the data for the forty-sixth report, the enumerating, classifying, arranging, and collecting in tables for the purpose of presenting the various facts in such detail as to facilitate examination and study has been in progress during the time of making up this report, and affords some facts which may be presented at this time.

Below will be found some of the general results of the registry of births, marriages, and deaths during 1898.

BIRTHS.

SEX.		PARENT NATIVITY.	
Males	5,443	Native*	4,427
Females	5,287	Foreign	6,303
Whole number of births	10,730.		

*Including all whose fathers were born in the United States, whether the fathers were of foreign parentage or native.

MARRIAGES.

Native born Groom and Bride	1,522
Foreign born Groom and Bride	991
Native Groom and Foreign Bride	402
Foreign Groom and Native Bride	363
Whole number of marriages	3,278
Native Grooms	1,924
Foreign Grooms	1,354

DEATHS.

SEX.		NATIVITY.	
Males	3,554	Native	4,957
Females	3,351	Foreign	1,948
Whole number of deaths	6,905		

There was one birth to every 38.6 of the population, or ..... 25.9 births in every 1,000
One person married in every 65.2 of the population, or ..... 15.8 persons married in every 1,000
And one death in every 60.0 of the population, or ..... 16.7 deaths in every 1,000
Population for 1898 414,413

The following summary will show the rates, per 1,000 of the population, of births, marriages, and deaths, for twelve years.

	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898
Birth-rates	24.2	24.2	24.1	24.7	26.5	25.2	26.5	26.6	25.7	27.3	26.8	25.9
Death-rates	19.9	20.4	19.0	20.1	18.6	20.1	19.6	19.5	19.6	19.1	17.6	16.7
Excess of Birth-rates over Death-rates	4.2	3.8	5.1	4.6	7.9	5.1	6.9	7.1	6.1	8.2	9.2	9.2
Marriage-rates — persons married	18.0	18.7	18.4	18.5	18.7	19.1	18.7	17.4	18.2	17.0	15.6	15.8
Ratio of number of marriages	9.0	9.3	9.2	9.3	9.3	9.6	9.4	8.7	9.1	8.5	7.8	7.9

The following table will present the number, parentage, and proportion to total mortality of deaths from several of the most prominent causes of death, in their order of precedence.

	Whole No. of deaths.	Percentage of deaths from all Causes.	Parentage		Excess of Foreign over Native.
			Native.	Foreign.	
Consumption	886	12.83	272	614	342
Heart Diseases	549	7.95	282	267	—15
Pneumonia	542	7.85	218	324	106
Kidney Diseases	471	6.82	207	264	57
Cholera Infantum	468	6.78	163	305	142
Apoplexy	416	6.02	245	171	—74
Brain Diseases	327	4.74	131	196	65
Accidents	296	4.29	111	185	74
Cancer	279	4.04	159	120	—39
Bronchitis	236	3.42	76	160	84
Enteritis	233	3.37	104	129	25
Old Age	205	2.97	135	70	—65
Diphtheria	93	1.35	34	59	25
All causes	6,905	100.00	2,938	3,967	1,029

LONGEVITY OF DECEDENTS.

	1898.	1897.	1896.	1895.	1894.	1893.
Average age in years of Male decedents	34.34	33.71	30.86	31.70	32.47	30.97
Female "	36.34	37.06	34.47	36.49	34.40	33.99
Total "	35.31	35.37	32.61	34.08	33.44	32.46

There has been a gradual increase during the last thirty-eight years in the average length of life of decedents, taking periods of five years each, running from about twenty-nine and thirty-two one-hundredths years, at the beginning, to thirty-four and sixteen one-hundredths years at the ending, in 1897.

PERCENTAGE OF MORTALITY BY CLASSES.

	1898.	1897.	1896.	1895.	1894.	1893.
Zymotic diseases	29.53	32.24	32.34	34.02	22.02	22.89
Constitutional diseases	4.56	4.27	3.80	3.98	16.05	16.04
Local diseases	41.95	39.63	38.25	37.34	46.18	46.13
Developmental diseases	18.18	18.78	20.13	19.18	10.92	9.74
Violence, etc.	5.78	5.08	5.48	5.48	4.82	5.20

The large increase of percentage in the class of local diseases previous to 1894 was due to the increase in number of deaths from

pneumonia, the greatest number of deaths being due to this cause in 1893, there being 121 more than in 1892 and 208 more than in 1891. There were 111 less deaths from pneumonia in 1894 than in 1893, 20 more deaths from same cause in 1895 than in 1894, in 1896 16 less deaths than in 1895, 34 less deaths in 1897 than in 1896, and 93 less deaths in 1898 than in 1897.

RATIOS OF MORTALITY.

As compared with the year 1897 there was little change in 1898 in the proportional mortality of several of the most important diseases occurring in larger or small numbers every year.

APPOPLEXY AND PARALYSIS.—The deaths from these diseases were nearly the same in each of the years 1891 (335) and 1892 (338). In 1893 these had increased to 407; in 1894, to 415; in 1895, to 417; in 1896 there were 419 deaths from apoplexy and paralysis; in 1897, 469; and in 1898, 416.

BRONCHITIS—The deaths from bronchitis were 10 more than in the previous year. There has been a steady increase in the proportionate mortality from bronchitis during the last twenty years which must be attributed to something more than increased skill in differential diagnoses.

CANCER.—The deaths from cancer were 279 in 1898; 254 in 1897; 226 in 1896; and 234 in 1895. Cancer has increased considerably in its proportion of mortality to whole number of causes of death, during the last twenty-five years, and is probably due to increased facilities in diagnosis.

CHOLERA INFANTUM.—There were 468 deaths from cholera infantum in 1898; 425 deaths in 1897; 545 deaths in 1896; and 500 deaths in 1895. The proportion to whole number of deaths was 6.78 per cent. For the last 33 years it has been about 6.4 per cent.

CONSUMPTION.—There were 765 deaths from consumption, or pulmonary tuberculosis, in 1898. This does not include 29 from

general tuberculosis. Added to this there were 57 deaths from tubercular meningitis, 14 from tubercular enteritis, 5 from tubercular laryngitis, 9 from tubercular peritonitis, and 7 from tabes mesenterica.

A decided contrast will be seen in the proportion of the different diseases, by observation of the diagram shown on page 127. Here, considering the condition for 33 years, it will be seen that consumption has exceeded pneumonia more than one hundred per cent. as a cause.

DIARRHŒA AND DYSENTERY.—The mortality from these diseases was 9 less in number than in the previous year, or 98 in 1898, and 107 in 1897.

DIPHTHERIA.—This disease had a mortality of 93 in 1898, which was 138 less than in 1897; 72 of these were in Providence county, 40 being in Providence city. The percentage to the whole number of deaths was 1.35. In 1897 it was 3.25.

FEVERS, MALARIAL.—These had a mortality of 31 in 1898, and 44 in 1897.

FEVER, TYPHOID.—There were 76 deaths from typhoid fever in 1898, and 66 in 1897. Typhoid fever, as a disease and as a cause of death, has gradually lessened in both proportions, as compared with other important diseases, during the last 15 years.

HEART, DISEASES OF.—The deaths from diseases of the heart numbered 549, against 570 in 1897. Diseases of this organ have been gradually increasing during the last thirty-two years. See Table LXXVIII, page 220, Reg. Rep.

INFLUENZA.—The number of deaths reported as from this disease in 1898 was 75, 78 less than in 1897. During the year 1892 there were 336 deaths from this cause.

KIDNEYS, DISEASES OF.—The number of deaths from diseases of the kidneys in 1898 was 471, the number in 1897 was 387. Diseases of these organs have been gradually assuming large im-

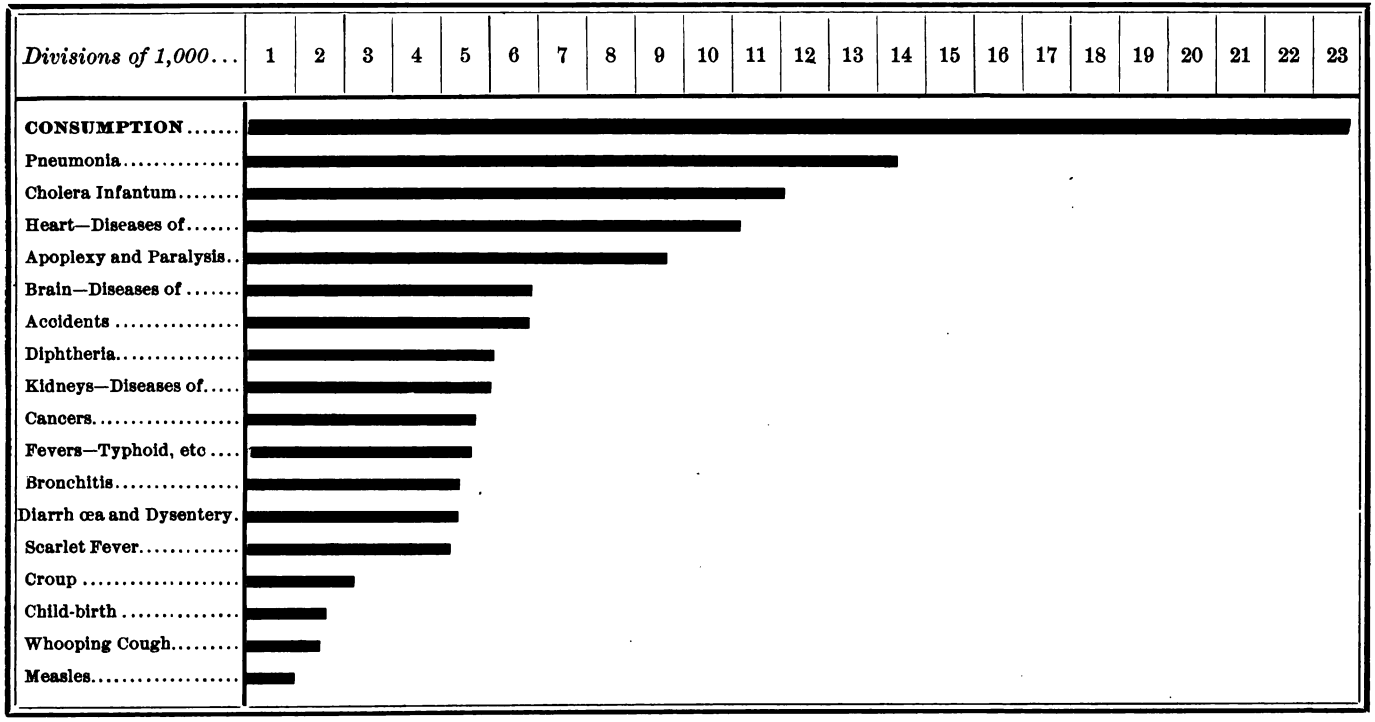
portance as causes of death during the last thirty-three years. The ratio of mortality for five years, 1885–89, was nearly five times as large as the ratio for the years 1890–95. See Table LXXXI, page 229, Reg. Rep.

PNEUMONIA.—The number of deaths caused by pneumonia in 1898 was 542, as against 635 in 1897. Pneumonia has gradually increased in importance as a cause of death for the last fifteen years. See Reg. Rep., Table LXXXVI, page 240.

SCARLET FEVER.—The number of deaths in 1898 was 21, 8 less than in 1897. The proportion was 0.3 per cent. of the whole number of deaths. Scarlet fever has largely decreased in epidemic prevalence and proportion of mortality during the last fifteen years, as compared with previous periods of fifteen years each.

SMALL-POX.—There were no deaths from small-pox in 1898, there were two in 1894, none in 1893, and four in 1892. The diminution of cases, and the decrease of mortality as a consequence, has been quite remarkable during the last fifteen years. The efficacy of vaccination has had remarkable endorsement.

Diagram exhibiting the comparative mortality by absolute number of deaths from eighteen principal causes of death in Rhode Island for thirty-three years, 1866–1898.



REPORT OF CONTAGIOUS DISEASES DURING 1898.

Since the year 1893 a system of reports of contagious diseases which have been reported to the health officers in the various towns and cities has been kept up by means of reports on circular postal cards to the State Board. This makes it possible to obtain a fairly comparative observation of the prevalence of these diseases during the several months, and in the course of the year.

It is admitted that not all cases of these diseases have been reported to the health officers. The physicians in two or three of the towns and cities do not make any effort to report their cases, owing to the inefficiency of the health officer and the apparent uselessness of making such reports, since no action, or only a tardy action, is taken to avail the public of the advantages accruing from the knowledge of the existence of these diseases. However, the failure to report being about the same every year, a comparison may be made.

By observation of the following tables it will be noted that the number of cases reported for *scarlet fever* were greater in 1895, and that during the year 1898 there were less than in any previous year.

The greatest prevalence of *diphtheria* during the past four years has been in 1896, the epidemic of 1895, continuing from the fall months, subsiding after January of the year following.

There have been fewer cases of *typhoid fever* reported each year since 1893 until 1898, in which year 251 cases were reported, an increase of 21 over the previous year. As this disease may be introduced by milk or water supplies, and its prevalence cannot

be determined until after the public have received the infection for a period of at least fourteen days, allowing seven days for incubation of the disease and seven days for the physician to become positive in his diagnosis, a few days must elapse before the health department is aware of the unusual prevalence, and be prepared to investigate any cause which may be ascertainable. Therefore, a sudden rise in numbers might occur in any one month of a year which would raise the total above the average.

Contagious Diseases Reported in 1898.

DIPHTHERIA.

Cities and Towns.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Barrington	0	0	0	0	*	0	*	*	*	0	0	1	1
Bristol	0	0	0	0	0	0	0	0	0	0	0	0	0
Warren	1	0	0	0	0	0	0	0	0	0	0	0	1
Coventry	*	*	0	1	0	0	*	*	*	0	0	0	1
East Greenwich	0	0	0	0	0	*	*	0	0	0	0	0	0
West Greenwich†													
Warwick	0	0	0	1	7	1	1	0	0	0	0	1	11
Jamestown	0	*	0	0	0	0	0	0	*	0	*	*	0
Little Compton	*	*	0	0	0	0	0	0	0	0	0	0	0
Middletown	0	0	0	0	0	0	0	0	0	0	0	0	0
Newport	0	0	0	0	0	3	1	0	0	0	0	0	4
New Shoreham	0	0	0	0	*	*	*	*	*	*	*	*	0
Portsmouth	0	0	0	*	*	*	*	*	0	0	*	0	0
Tiverton	0	0	0	0	0	0	0	0	0	0	2	0	2
Burrillville	*	0	0	0	0	0	0	0	0	0	0	0	0
Central Falls	2	0	1	1	1	0	0	0	0	2	2	2	11
Cranston	*	5	3	3	3	1	0	2	0	0	5	3	25
Cumberland	*	*	*	*	*	*	*	*	*	0	*	*	0
East Providence	*	*	*	*	*	*	*	*	*	*	*	*	*
Foster	0	0	*	*	0	0	0	0	0	0	0	0	0
Glocester	0	0	0	0	0	0	0	0	0	0	0	0	0
Johnston	*	1	0	0	*	0	0	*	0	0	*	*	1
Lincoln	1	0	1	0	0	*	*	*	0	0	1	*	3
North Providence	0	0	0	0	0	0	0	0	0	1	0	0	1
North Smithfield	1	0	0	1	0	0	0	0	0	0	0	0	2
Pawtucket	3	3	5	2	2	0	2	0	1	3	3	*	24
Providence	29	29	17	14	14	7	*	4	8	25	25	20	192
Scituate	0	0	0	*	0	0	0	0	0	0	0	0	0
Smithfield	1	2	0	0	0	0	0	0	0	1	0	0	4
Woonsocket	6	6	4	7	*	4	4	0	2	*	*	4	37
Charlestown	*	*	*	*	*	0	*	0	*	*	*	*	0
Exeter†													
Hopkinton	0	0	0	0	1	*	3	0	0	1	1	0	6
Narragansett	0	0	0	0	0	0	0	0	0	0	0	0	0
North Kingstown	1	0	0	0	0	1	0	0	0	*	0	0	2
Richmond	*	0	0	0	0	*	*	*	*	*	*	*	0
South Kingstown	6	0	0	0	0	0	0	0	0	0	0	0	6
Westerly	3	0	0	0	0	2	2	0	1	1	0	*	9
Total cases	54	46	31	30	28	19	13	6	12	34	39	31	343
Total cases, 1897.	103	47	67	59	61	48	38	59	77	146	117	70	893
Total cases, 1896.	117	76	74	108	70	49	53	45	69	121	114	125	1021
Total cases, 1895.	62	33	31	26	50	35	55	52	100	137	227	164	972
Total cases, 1894.	35	17	31	22	41	32	7	10	23	33	32	58	341

* No report from the health officer.
† Has no health officer.

Contagious Diseases Reported in 1898.

SCARLET FEVER.

Cities and Towns.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Barrington	0	0	0	0	*	0	*	*	*	1	0	5	6
Bristol	7	3	1	1	0	1	0	0	0	1	0	0	14
Warren	0	0	0	0	0	0	0	0	1	2	8	1	12
Coventry	*	*	0	0	1	0	*	*	*	0	0	0	1
East Greenwich	0	0	4	0	0	*	*	0	0	0	0	0	4
West Greenwich†													
Warwick	3	4	2	3	1	1	0	6	3	12	8	11	54
Jamestown	0	*	0	0	0	0	0	0	*	0	*	*	0
Little Compton	*	*	0	0	0	0	0	0	0	0	0	0	0
Middletown	0	0	0	1	0	0	0	0	0	0	0	0	1
Newport	0	3	0	1	2	6	1	0	0	0	1	2	16
New Shoreham	0	0	0	0	*	*	*	*	*	*	*	*	0
Portsmouth	0	0	0	*	*	*	*	*	0	0	*	0	0
Tiverton	2	0	0	1	0	0	0	0	4	0	1	0	8
Burrillville	*	3	0	0	3	3	2	1	0	0	0	0	12
Central Falls	5	3	0	5	2	0	2	0	2	3	0	0	22
Cranston	*	2	3	2	2	2	2	2	0	10	5	4	34
Cumberland	*	*	*	*	*	*	*	*	*	3	*	*	3
East Providence	*	*	*	*	*	*	*	*	*	*	*	*	*
Foster	0	0	*	*	10	4	0	0	0	0	0	0	14
Glocester	0	0	0	0	4	3	0	3	0	1	0	0	11
Johnston	*	0	3	0	*	0	0	*	0	0	*	*	3
Lincoln	2	1	1	1	1	*	*	*	1	2	8	0	17
North Providence	0	0	0	0	0	0	0	0	0	0	0	0	0
North Smithfield	0	0	0	0	0	0	0	0	0	0	1	0	1
Pawtucket	2	4	2	4	9	7	4	3	5	5	6	*	51
Providence	41	23	15	16	12	12	*	6	9	16	19	18	187
Scituate	0	0	3	*	1	3	0	0	0	22	5	1	35
Smithfield	1	3	0	2	6	2	0	0	0	1	3	1	19
Woonsocket	1	2	2	1	*	2	2	3	1	*	*	2	16
Charlestown	*	*	*	*	*	0	*	0	*	*	*	*	0
Exeter†													
Hopkinton	0	0	0	0	0	*	0	0	0	0	0	0	0
Narragansett	0	0	0	0	0	0	0	0	0	0	0	0	0
North Kingstown	0	0	0	0	1	0	0	1	0	*	0	0	2
Richmond	*	0	0	0	0	*	*	*	*	*	*	*	0
South Kingstown	1	0	0	2	3	2	2	0	0	0	0	0	10
Westerly	1	6	11	0	0	0	0	0	0	0	1	*	19
Total cases	66	57	47	40	58	48	15	25	26	79	66	45	572
Total cases, 1897.	80	47	47	51	34	57	41	35	42	76	53	65	629
Total cases, 1896.	78	97	61	72	48	30	29	28	33	46	92	87	701
Total cases, 1895.	168	132	118	123	69	78	56	47	55	63	87	91	1087
Total cases, 1894.	133	95	91	70	71	53	33	33	58	77	103	122	939

* No report from the health officer.
† Has no health officer.

Contagious Diseases Reported in 1898.

TYPHOID FEVER.

Cities and Towns.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Barrington	0	0	0	0	*	0	*	*	*	1	1	0	2
Bristol	0	0	1	0	0	0	1	0	0	0	0	0	2
Warren	0	0	0	0	0	0	0	0	1	0	3	0	4
Coventry	*	*	0	0	0	0	*	*	*	0	0	0	0
East Greenwich	0	0	0	0	0	*	*	0	0	0	0	0	0
West Greenwich†	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Warwick	0	0	0	0	0	0	0	0	1	0	0	0	1
Jamestown	0	*	0	0	0	0	0	0	*	1	*	*	1
Little Compton	*	*	13	0	1	0	0	0	0	0	0	0	14
Middletown	1	0	0	0	0	0	0	0	0	1	0	0	2
Newport	3	1	1	2	2	2	0	0	7	14	1	1	34
New Shoreham	0	0	0	0	*	*	*	*	*	*	*	*	0
Portsmouth	0	0	0	*	*	*	*	*	0	0	x	0	0
Tiverton	1	2	1	1	0	0	0	1	0	0	0	0	6
Burrillville	*	0	0	0	0	1	1	0	0	0	0	0	2
Central Falls	0	0	1	0	0	0	1	0	0	2	1	0	5
Cranston	*	1	1	1	0	0	0	0	0	2	1	3	9
Cumberland	*	*	*	*	*	*	*	*	*	0	*	*	0
East Providence	*	*	*	*	*	*	*	*	*	*	*	*	*
Foster	0	0	*	*	0	0	0	0	0	0	0	0	0
Glocester	0	0	0	0	0	0	0	0	0	0	0	0	0
Johnston	*	0	2	2	*	0	0	*	0	0	*	*	4
Lincoln	0	0	0	0	0	*	*	*	0	0	1	*	1
North Providence	0	0	0	0	0	0	0	0	0	0	0	0	0
North Smithfield	0	0	0	0	0	0	0	0	0	0	0	1	1
Pawtucket	4	0	0	1	1	0	1	2	1	1	4	*	15
Providence	7	13	12	10	5	1	*	11	16	14	13	16	118
Scituate	0	0	0	*	0	0	0	0	1	0	0	0	1
Smithfield	1	0	0	0	0	0	0	0	0	0	0	2	3
Woonsocket	0	0	0	0	*	1	1	2	0	*	*	1	5
Charlestown	*	*	*	*	*	0	*	0	*	*	*	*	0
Exeter†	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hopkinton	0	0	0	0	0	*	0	0	0	0	0	0	0
Narragansett	0	0	0	0	0	0	0	0	0	1	0	0	1
North Kingstown	0	1	0	1	0	1	0	0	0	*	0	1	4
Richmond	*	1	0	0	0	*	*	*	*	*	*	*	1
South Kingstown	3	1	0	0	0	0	1	0	0	1	0	3	9
Westerly	0	0	1	0	1	0	2	0	1	1	0	*	6
Total cases	20	20	33	18	10	6	8	16	28	39	25	28	251
Total cases, 1897.	18	9	6	8	12	9	5	21	33	37	35	35	230
Total cases, 1896.	33	17	21	14	9	13	19	46	65	31	31	26	325
Total cases, 1895.	104	35	15	18	8	13	30	25	34	46	53	90	471
Total cases, 1894.	61	27	54	23	25	14	13	54	59	76	55	31	492

* No report from the health officer.
† Has no health officer.

DIPHTHERIA.

By means of the appropriation of fifteen hundred dollars, made available by the Legislature at its January session, there have been examined 1,475 cultures of material taken from sore throats in which there might be present the organism which produces diphtheria, and known as the "Klebs Löeffler bacillus."

Of the 1,475 cultures, 343 cultures were taken from cases when the throat presented clinical symptoms of "sore throat," tonsilitis, or where the conditions were obscure.

In 57 of these 343 cultures there was found the presence of the bacillus of diphtheria. These positive findings occurred in cases diagnosed as tonsilitis or in the condition of simple "sore throat," thus showing that the clinical symptoms observed by the eye cannot always be relied upon. On the other hand, in 275 cases considered to be diphtheria by the attending physician the bacillus of diphtheria was found in only 144 cases, or a little more than half of the number. While it is possible that from unsuccessful swabbing of the throat or imperfect culture methods these typical organisms were not present in the growth, yet in the majority of cases the clinical diagnosis has been negatived by the early disappearance of membrane from the throat and rapid recovery of the patient.

Of the 275 cases diagnosed as diphtheria there was membrane present in 190 cases.

In 414 cases there had been previous cases present in the family.

For the purpose of ascertaining whether there may not be a second or more cases existing in the family of an original case, it has been the requirement of the health department of the city

of Providence that every throat in the family shall be examined for the presence or absence of the typical bacillus of the disease before such members of the family may be considered free from quarantine. Precautionary cultures were taken in this manner in 395 cases, and the bacillus of diphtheria found to be present in 36 of these cases which would otherwise have been allowed to mingle with the populace or with other children in case the person was young. This unsuspected presence of the specific infection in the throats of healthy children, and its continuance in the throats of children having had the disease but who have apparently recovered, explains the persistency with which epidemics asserted themselves in years past, before the bacteriological methods were brought to the assistance of the physician and health officer.

Secondary or subsequent cultures were taken from throats where the disease was actually found to be present in 443 cases. Of these the throat was found to be free of the organisms upon a second culture in 241 cases.

Table of Results of Examinations of Diphtheria Cultures, January 1st, 1898, to January 1st, 1899.

PRIMARY CULTURES.

Clinical Diagnosis.	Total number primary cultures.	Results.												Location of Membrane.						Duration of Disease				
		Total number K. L. present.	K. L. pure.	K. L. Mic.	K. L. Mic.-Strep.	Total K. L. absent.	Mic.	Mic.-Strep.	Mic.-Strep. Bac.	Mic. Bac.	Mic. Dip.	Bacilli.	Contam. no growth.	Tonsils.	Pharynx.	Tonsils and Pharynx.	Other parts of throat.	None seen.	None given.	Where there are other cases in family	One day.	Few days.	One week.	Weeks.	One month or more.
Tonsilitis	147	25	13	12	....	122	77	27	1	10	2	1	4	94	2	3	...	30	18	29	65	68	8	....	....
Follicular tonsilitis	86	13	4	9	....	73	35	15	3	4	2	2	2	70	1	3	2	5	5	13	42	41	....	....	....
Diphtheria	275	143	47	91	5	131	73	30	3	15	1	4	5	138	18	13	21	27	58	81	69	129	18	25	3
Pharyngitis	72	10	5	5	....	62	32	13	2	8	1	6	....	4	4	....	3	49	12	32	19	16	4	1	....
No diagnosis	11	....	....	....	....	11	8	2	1	....	....	....	....	2	....	....	....	3	6	3	1	4	....	1	....
Croup	16	6	....	6	....	10	5	2	....	3	....	....	....	....	....	....	4	6	6	2	3	9	2	1	....
Sore throat	27	9	....	8	1	18	11	2	....	2	1	1	1	6	....	....	2	8	11	6	8	14	1	....	....
Scarlet fever	3	1	1	....	....	2	2	....	....	....	....	....	....	2	....	....	....	1	....	....	1	2	....	....	....
Precautionary	395	36	8	28	....	359	206	88	2	28	5	21	9	2	1	....	1	70	321	248	1	3	3	....	....
Totals	1,032	243	78	159	6	788	449	179	12	70	12	35	21	318	26	19	33	199	437	414	209	286	36	28	3

SECONDARY CULTURES.

	Total number secondary cultures.	Results.											Duration of Disease.				
		Total number K. L. present.	K. L. pure.	K. L. Mic.	K. L. Mic.-Strep.	Total K. L. absent.	Mic.	Mic.-Strep.	Mic.-Strep. Bac.	Mic. Bac.	Mic. Dip.	Bacilli.	Contain no growth.	One day.	Few days.	One week.	Weeks.	One month or more.
Secondary cultures	443	137	33	97	7	306	189	76	1	23	.....	8	9	9	28	42	70	28

The following table shows the number of successive cultures which were taken before a negative result was obtained:

	Second examination.	Third examination.	Fourth examination.	Fifth examination.	Sixth examination.	Seventh examination.	Eighth examination.	Ninth examination.	Tenth examination.	Eleventh examination.	Total.
Cultures.....	241	95	47	28	19	9	7	1	1	1	448

TUBERCULOSIS.

Examinations of Sputum for Tuberculosis, from January 1, 1898, to January 1, 1899.

Clinical Diagnosis.	Total.	Tubercular Bacilli present.	Tubercular Bacilli absent.	Past cases in family.	Present cases in family.
Bronchitis	89	20	69	19	2
Bronchitis, chronic	22	6	16	7	.....
Tuberculosis, pulmonary	304	163	141	96	2
Suspected tuberculosis	29	12	17	13	1
Exposed to tuberculosis in milk	1	.....	1	.....	.....
Tubercular laryngitis	3	3	.....	.....	.....
Laryngitis	3	.....	3	.....	.....
"Catarrh"	1	.....	1	.....	.....
Pleurisy	2	1	1	1	1
Pharyngitis	1	.....	1	1	.....
Pneumonia	7	4	3	1	.....
Grippe	3	2	1	1	.....
Total	465	211	254	139	6

TUBERCULOSIS.

Number of examinations of sputum 465
Number in which tubercle bacilli were found 211
Number in which tubercle bacilli were not found 254

During the year there were 465 specimens of sputum submitted for examination, with the supposition on the part of the attending physician that tuberculosis might be a factor in the causation of the symptoms of the patient.

Of these, in 304 the clinical symptoms present were sufficiently distinctive to lead the physicians to believe that tuberculosis of the *lungs* was present. In 163 of these cases the examination of the specimen of sputum showed the presence, in greater or lesser quantity, of tubercle bacilli. This would make 54 per cent. of cases where the clinical diagnosis coincided with the bacterial findings, while in 141 cases, or in 46 per cent., the bacilli of this disease were not found. While this negative result is of value, yet it does not carry the weight of a distinct negative, as to the actual presence of the disease, for it is possible to obtain from the patient a specimen of sputum which is composed of only the saliva and secretions from the larynx, and containing none from the air passages in the lungs. The organisms may also be present at times, in the lung, either lying dormant or encapsulated, and will not be discharged into the air passages, and become a part of the sputum, until a degenerative process is set up which breaks down the tissues about the organisms and sets them free.

In the three cases of tubercular laryngitis all were positive. The application of this method of diagnosis is especially valuable in this form of the disease, inasmuch as the appearance of the larynx may indicate the presence of ulcerative processes, and the formation of tubercles from other causes.

It is of especial value in these cases, for the organism may not as yet have invaded the lung, but if the cases are neglected, they may readily be carried to the lung or intestine, and there propagate the disease.

It is of interest to note that, of 111 cases of chronic and acute bronchitis, in 26 cases the diagnosis was erroneous, and the presence of tuberculosis was established in the bronchi, if not, also, in the lungs. The constitution of the patient, however, being sufficiently strong, as yet, to prevent the invasion of the organisms

into large areas, the symptoms present were not sufficiently distinct, or alarming, to warn the physician of the dangerous element which was present. In 26 instances, where the diagnosis of bronchitis was made, there had been other cases of the disease in the family.

RECORDS OF ALL CASES OF CONSUMPTION IN THE STATE.

As a part of the investigation of the subject of tuberculosis in man, a card catalogue record of all deaths from pulmonary tuberculosis has been arranged. At present this data is available from the commencement of the year 1890, and is completed to date. This division of the work affords much interesting material for study. The number of deaths for the different years was as follows:

Deaths in 1890	911
" " 1891	814
" " 1892	848
" " 1893	812
" " 1894	825
" " 1895	839
" " 1896	846
" " 1897	777
" " 1898	886
Total	7,558

These 7,558 cases are recorded on cards with the following data: Name, address, age, color, married, single, or widow, name before marriage, and date of death. By collecting the names in this way it is observed that certain names recur at varying periods of time, and by looking up the individual case further it will be found that this death has occurred in a family where previous deaths from consumption have taken place, the address in many cases being the same.

In 119 instances there were two cases occurring in the same family; in 14 instances, three cases; and in 4 instances, four cases.

Should the records go back for more years, a larger number would be discovered.

In addition to the card catalogue of the names of the decedents, a separate card catalogue of the *premises* where the death occurred has been kept, and thus it is possible to ascertain when any particular house may have, by chance, been infected with this disease. It is further possible to ascertain if more than one case has occurred in any one house.

Of the 7,558 premises recorded, more than one case has been reported in 308 instances in Providence city. In 34 instances there had occurred three cases in the same house, and in 4 instances four.

Of the instances where there were two cases in a house, in 104 they were of the same family, while in 166 cases they were of different names, presumably of different families. Of the three cases in a house, in 10 instances they were of the same family. Of the four cases in a house, in one instance all were of the same family; in the other instances the persons were not of the same family.

Outside the city of Providence there were 38 instances where more than one case had occurred on the same premises, distributed as follows: Bristol, 2; Newport, 28; East Providence, 2; Pawtucket, 2; and Woonsocket, 4. In four of these there were three cases in the same house. In 13 of those having two cases in the house the persons were of the same family.

State and other public institutions are not included in this list.

ADMINISTRATION UNDER THE MEDICAL PRACTICE ACT.

HEARING UNDER THE MEDICAL PRACTICE LAW.

A certain physician, having made application for a certificate, upon presentation of a diploma from the Boston University, had been referred for supplementary examination on the grounds that said school required but a three years' course inasmuch as it admitted to advanced standing in the second year graduates of schools which were not medical schools.

As a result of the action of the Board, a request had been made that a hearing be granted to the dean of the school to explain the requirements of the school and to show why such a ruling should not apply to the Boston University. He stated that this school was one of the first to raise the standard to a four-year course. This school admits graduates from a scientific school or college to the second year upon examination in the branches passed the first year in the school.

He claimed that a student who had taken a biological course in any of these colleges extending over three or four years, with the study of English and scientific branches, would have learned as much if not more than a high school graduate or any one passing matriculation examination, and would be far better prepared to learn any subject and especially the subjects which are presented during the last three years of a medical course. It was assumed that in these accepted schools the subject of anatomy with comparative anatomy, chemistry, biology, physiology, and histology were taught. He admitted that it was with some difficulty that the required amount of dissection could be crowded into the second year.

He called the attention of the Board to the fact that the Harvard Medical School admitted to the second year on these same conditions. It is the desire of President Eliot, of Harvard College, and of the faculty of other colleges, to make a limit of the collegiate and professional courses together to seven years.

He did not object to having his students appear upon their qualifications, since 70 per cent. was required for graduation; but he did dislike to have distinctions made against his school when compared with others.

Prof. Sutherland, the dean, having retired after considerable discussion and explanation to the Board, the subject was considered by the Board, and it was determined that at present the Board would not change its ruling in this matter.

Dr. W. H. Merrill was granted a hearing on the eighteenth of August. Although he had been in practice for several years since the law had been passed, yet it was but a short time previously that he had made an application to the Board and after having been notified of the conditions of the law.

His application had been refused on the grounds that the applicant was merely a temporary visitor to this State during the summer months, and had no permanent residence except in a hotel during his stay here, and was therefore rated as an itinerant to whom a certificate could not be issued according to the General Laws.

Dr. Merrill stated that he had resided in Pepperill, Mass., for many years. During the past winter he had lived in Florida, and had also resided elsewhere. That he had not opened or sustained an office for the practice of medicine in Pepperrill or at any other location for several years, but that he had been in practice at Watch Hill, R. I., for several summers, being for the past four years located there. He claims to be a resident of the State by being related to the ownership in property through marriage. He had also filed with the Board a sworn declaration that he was a resident of the State.

A number of affidavits subscribed and sworn to before officers

of law were presented and representing it to be a fact that Dr. W. H. Merrill had not for several years supported an office as a physician in the town of Pepperill. The application of Dr. Merrill was thereupon reconsidered and certificate granted.

RULINGS OF THE BOARD MADE ON THE MEDICAL PRACTICE ACT DURING THE YEAR.

The following rulings were adopted at the meeting held on December 17, 1896.

Resolutions Governing the Issuance of Certificates upon Presentation of Diplomas:

Resolved, That all applicants applying for a certificate to practice medicine in the State of Rhode Island, presenting a diploma from any foreign medical school, must pass an examination before the State Board of Health upon the following subjects: anatomy, physiology, chemistry, therapeutics, materia medica, surgery, theory and practice of medicine, obstetrics, gynæcology, hygiene, and State medicine. An average grade of eighty per cent. will be required as conditions of receiving a certificate to practice medicine or surgery in this State.

Resolved, That the diplomas from all recognized medical colleges in the United States, requiring a minimum of three years study of medicine and two courses of lectures for graduation prior to 1885, shall be recognized as in good standing; and diplomas issued by the same prior to that date, properly verified, shall entitle the holder thereof to a certificate to practice medicine and surgery in this State.

Resolved, That for the ten years ending January 1, 1895, all medical colleges exacting the foregoing requirements shall, by virtue of such fact, be recognized as in good standing and to include the year 1891; but that no medical college shall be recognized as in good standing which has not since 1891 possessed the foregoing requirements, and which has not, in addition, exacted an entrance qualification and attendance upon three regular courses of lectures, no two courses to have been given in any one year, as a condition of graduation.

Resolved, That on and after July 1, 1895, no medical college shall be recognized as in good standing which does not require an entrance qualification representing as a minimum a high school diploma or its equivalent

as a prerequisite for matriculation; which does not possess an adequate equipment for teaching medicine; which has not the clinical and hospital facilities, based upon a minimum municipal population of fifty thousand, and which does not have an active faculty embracing the departments of anatomy, physiology, chemistry, therapeutics, materia medica, surgery, medicine, obstetrics, histology, pathology, bacteriology, ophthalmology, otology, gynæcology, laryngology, hygiene, and State medicine, and which does not enjoin attendance upon eighty per cent. of four regular courses of instruction of not less than twenty-six weeks each in four different years, and which does not exact an average grade of seventy-five per cent. on examination as conditions of graduation.

Resolved, That no medical college shall be recognized as in good standing in which the student is conditioned in one or more of the branches or requirements for matriculation, or that admits to advanced standing students that are matriculants of colleges of pharmacy or colleges of veterinary medicine, or upon the possession of an academic degree.

Resolved, That all resolves and parts of resolves heretofore passed by this Board inconsistent with the foregoing resolutions are hereby repealed, and these resolutions shall take effect from and after their passage.

The ruling in reference to the standing of foreign schools was revoked, thus admitting to good standing all foreign schools possessing these requirements.

APPEALS FROM DECISIONS OF THE BOARD.

One Matthew Curran, of the city of Pawtucket, presented through his attorney an appeal to the Appellate Division of the Supreme Court, and stated that the Board had refused to grant him a certificate on the time limit form.

The applicant presented witnesses whose evidence showed that before January 1, 1892, the appellant had been in the habit of doing a general barber business and in conjunction therewith had, at various times, advised and treated certain of his customers and some other persons by means of a liniment which he prepared according to a secret formula of which he was alone possessed. The name of this liniment was "Matt. Curran's Base Ball Liniment," and, if the evidence submitted to the court was cor-

rect, and the witnesses being under oath it was assumed that only the truth was being given, it must be assumed that this liniment was a sufficiently strong counter irritant to be efficacious in cases of rheumatism and in contusions, and strange to say was at the same time equally efficacious as an internal remedy, when used in the same strength, being non-irritating to the more tender mucous membrane of the mouth and throat.

The defence of the Board in the case presented to the court was that no application for a certificate from Matthew Curran had yet been received by the Board, and hence the Board had had no opportunity to refuse a certificate in this case.

The court thereupon informed the attorney for the prosecution that the court had no jurisdiction in the case, that he had erred in bringing the case, and referred him to the State Board of Health where he might make application in proper form.

At a meeting of the Board subsequently a proper form of application was presented and considered, and as the evidence presented before the court at the time of the false appeal, together with affidavits which were presented with the application, tended to show that the applicant Curran was engaged in the practice of medicine, according to his methods, before the time prescribed by law, a certificate under the time limit form was ordered issued to him.

The appeal of Julius A. Pirlot, entered two years previously, has not yet been called.

The original prosecution against Pirlot for engaging in the practice of medicine without certificate had been made before the court of Common Pleas and he was found guilty.

He then carried his case to the Appellate Division of the Supreme Court on exceptions. It was found by the Appellate Division that in the case tried in the Court of Common Pleas, the judge erred in his charge to the jury by stating to the jury that "it did not matter whether the defendant took a fee for his services or not." The case was therefore remanded to the lower court and the finding of that division reversed.

The case was then entered by the attorney-general for a new trial. After being set over by the court several times, and after one or two failures of the defendant to appear on account of illness, the case was finally tried, the jury disagreeing, standing seven to five against the defendant.

IMPROVEMENT OF WATER SUPPLIES.

TEN MILE RIVER.

For several years a portion of the town of East Providence has been supplied with water taken from the Ten Mile River at Hunt's Mills, and controlled and supplied by the East Providence Water Company.

This river finds its source in southeastern Massachusetts, and before reaching the borders of this State it passes by and through several villages and through the town of Attleboro. At all these points refuse matters and wastes, including excrementitious wastes, find their way into the river.

Owing to the danger of an outbreak of some diarrhœal disease or of typhoid fever as the result of the ingestion of this water by the consumers, it became the duty of the Board to call attention to this state of affairs and, if possible, to either cause to have removed the various means of contamination or to see that the water was purified from the dangerous constituents.

The secretary therefore notified the managers of the East Providence Water Company of the dangers present and the urgent need of prompt action. It was pointed out that either the danger must be removed or the consumer must be warned of the danger, which would be equal to an injunction without legal force. As no epidemic of any water borne disease prevailed it was not deemed necessary nor judicious to unnecessarily alarm the consumers, inasmuch as with the assistance of the imagination many states of illness might be induced which had no foundation.

An inspection of the river was made by the Board on June 9,

1898, and the following sources of contamination of the river were noted:

North Attleboro.

1. Whitney factory; jewelry; brick, with high tower; 250 employees when full; office water-closets deliver into covered cess-pool at south end of factory; overflow of cess-pool empties into swamp across the road; the Ten Mile river.

The closets for operatives deliver into the river under the bridge which crosses the river.

There are two six-inch pipes visible, opening through wall on side of river near factory, one of which is delivering large quantities of clear water.

An acid coloring shed stands over the river, the washings and acids dropping constantly through the floor into the river.

2. Union Power Company; next mill north of Whitney factory; large structure of wood; water-closets of the office deliver into sewer in the road; this sewer runs to the river as far as Whitney factory, and delivers under the bridge into the river; there are 100 operatives, but the excreta of the operatives is received in a tight cement vault and has no overflow.

3. Whitings' pond presents a large area and is evidently of good depth.

4. Whiting's mill; 30 to 50 operatives; water-closets deliver direct into sewer in street in front of mill; sewer delivers into river.

5. Coddington Company; 60 operatives; all discharges deliver into a trench which leads into the river; the flow at the time of visit was highly colored, as were the banks of the trench. (This mill is just across the river from the Whitney factory, Item 1.)

6. Bell Company; wooden structure; side of a large stone structure; number of operatives not ascertained; jewelry; two vaults are located over a brook which leads from the overflow of the pond. The stones beneath the seats have been washed clean from excrement.

7. Gold Medal Braid Company; stone structure north of Bell Company; only about 50 operatives at present; manufacturer of yarns; closets deliver into a four-inch soil-pipe; soil-pipe delivers into a tail-race which runs under the center of the mill in the basement; soil-pipe is near front of mill.

8. Fisher & Studley Bros.; wooden structure back of and to west of Item 7; up the hill; 100 hundred operatives; jewelry; wastes delivered into same tail-race as No. 7.

9. Freeman's jewelry shop; 50 to 150 employees; discharges delivered into tail-race; tail-race into river; also wooden privies over tail-race, which are not used as much as formerly.

10. R. F. Simmons Company; jewelry; 300 operatives; closets deliver into waste-pipe; waste-pipe into Bungay river, side of mill; Bungay river delivers into Ten Mile river.

Attleboro.

11. County Street Bridge; an eight-inch iron waste-pipe delivering foul-smelling water with sewage odor, and also frequently soft pieces of paper.

12. Bushee plant, above the bridge; jewelry; average of 250 operatives; wooden closets outside of building, have a wooden trench beneath the seats; this is flushed and delivers into river; at mouth of trench is an accumulation of small pieces of paper.

12. J. M. Bates plant is a new building being erected on opposite bank of river and will be used for the manufacture of jewelry, and will probably deliver discharges into river.

14. The W. D. Wilmarth plant, across the bridge and opposite Bushee plant (Item 12), does not deliver wastes into river but into vaults.

15. Blake Brothers are building a large jewelry factory on the banks of the river below the bridge, and will probably deliver discharge into river.

At a meeting of the Board held June 23, 1898, the results of this inspection were considered. The secretary reported that in addition to the above findings he had discovered, as the results of a previous inspection, that the river was being polluted by the reception of excreta from a dye-house near Attleboro, above the railroad bridge; also at the mill at Dodgeville, where 250 employees are at work; also at the mill at Hebronville, which employs 300 operatives; also at a wood-working shop at Kent's Mills, where there were 40 to 50 hands.

This, added to the number computed as the result of the first inspection, would make the contamination of the river possible from about 4,300 persons.

The Board considered that the pollution was considerable in amount and was dangerous to health as a public water supply; and that action should be taken to remove, if possible, the sources

of contamination; and that pending these movements the water should be purified, if possible, in some manner so as to render it innocuous to the users of the supply.

The secretary was instructed to notify the State Board of Health of Massachusetts of the existence of these nuisances and to ask the assistance of said Board in removing the same.

The secretary reported that he had already conferred with the president and secretary of the Massachusetts Board and had received the assurance that all would be done possible with the present status of the Massachusetts law governing water supplies and streams.

The secretary also reported that he had received assurance from the representative of the East Providence Water Works Company that a filter plant would be immediately established at the pumping-station of the company to treat the whole supply issued by the company to its consumers.

The secretary was directed to notify the company of the result of the inspection of the Board and ask that immediate attention be given to the correction thereof.

The following communication was sent to the secretary of the State Board of Health of Massachusetts:

JULY 27, 1898.

To the State Board of Health, Boston, Mass.

GENTLEMEN:—As the results of a recent inspection of the Ten Mile river made by this Board at the towns of Attleboro and North Attleboro, it was found that a number of factories, mills, and the town of Attleboro were delivering their wastes, both from vaults and from the processes of manufacture, into the river.

The Ten Mile river, as already known, is the town supply of the town of East Providence in this State.

I am instructed by this Board to ask the assistance of your honorable body in the removal of these sources of contamination and to ask if any action can be taken by your Board in the matter legally or otherwise.

I send herewith memoranda of the inspection, which will give an idea of the extent of the pollution. Yours truly,

(Signed) GARDNER T. SWARTS,
Secretary.

The following communication was received in answer:

OFFICE OF STATE BOARD OF HEALTH, STATE HOUSE,
BOSTON, November 4, 1898.

To the State Board of Health of Rhode Island, Providence, R. I.

GENTLEMEN:—The State Board of Health received from your Board on July 28, 1898, a communication stating that as a result of a recent inspection of the Ten Mile river made by your Board in the towns of Attleborough and North Attleborough it was found that a number of factories and mills and the town of Attleborough were delivering their wastes, both from vaults and from the processes of manufacture, into the river, which is the source of water supply of the town of East Providence in Rhode Island. You request the assistance of this Board in the removal of these sources of contamination and ask if any action can be taken by this Board in the matter, legally or otherwise. Accompanying your communication were memoranda of the inspection referred to.

The Board has caused an examination of the valley of the Ten Mile river to be made by its engineer, and has carefully considered the results of previous examinations of the stream and its water-shed. From the information recently collected it appears that at the present time the sewage from as many as 4,500 people in the villages of Lebanon Mills, Kents Mills, Hebronville, Dodgeville, Attleborough, Robinsonville, Attleborough Falls, North Attleborough, Plainville, and South Attleborough is discharged directly into the stream or its tributaries, and that large amounts of sulphuric acid, nitric acid, hydrochloric acid, ammonia, spent dyes, and other substances used in the various manufactories are discharged into the river. Gas-wastes, wastes from a rendering establishment at which dead animals are disposed of, and wastes from a tannery also enter the stream.

Numerous chemical analyses of samples of water collected from this river at two points, one above North Attleborough and the other above Attleborough, were made several years ago, and the results were published in a special report of this Board, entitled "Examination of Water Supplies," published in 1890.

In this report it is stated that the pollution of the river at Attleborough was sufficient to render the water taken directly from the river unfit for drinking. No analyses of the water of the river below Attleborough were made at that time, but analyses made in more recent years have shown that the river is polluted to a much greater degree below the town than it is above.

The sewage discharged from the Attleborough sewers is the most serious pollution of the stream that exists at the present time, and the Board has already called the attention of the town of Attleborough to the objection to disposing of sewage by discharging it directly into the stream, and some action has been taken by the town looking to the removal of the sewage from the river and its purification upon land. If, however, the sewage of the town of Attleborough should be purified before it is discharged into the river, while a great improvement in the sanitary condition of the stream will be affected, the stream would, nevertheless, continue to be, in the opinion of this Board, a very dangerous source from which to take water for drinking or other domestic uses. Moreover, on account of the large population within the water-shed of the stream, and the numerous villages and mills widely scattered throughout this water-shed, it is impracticable, in the opinion of this Board, to prevent the pollution of the stream by sewage and manufacturing wastes to such an extent as to render the water safe for drinking.

The Board considers that the pollution of the river to the present degree is very objectionable from a sanitary standpoint, and that in the interests of the people of this valley further pollution of the stream should be prevented and the sewage of Attleborough, which is now discharged into the stream, should be removed therefrom and purified. The Board will urge the purification of the stream as rapidly as practicable, but, as already stated, it is not practicable in its opinion to render the water of the river below Attleborough suitable for drinking.

By order of the Board,

SAM'L W. ABBOTT,
Secretary.

PAWTUXET RIVER.

At a meeting of the Board held on November 10, 1898, the following communication was received from the Joint Committee on Filtration of the common council of the city of Providence:

(COPY.)

CITY OF PROVIDENCE,
CLERK OF COMMITTEES DEPARTMENT,
CITY HALL, October 29, 1898.

To the State Board of Health.

GENTLEMEN:—The Joint Special Committee of the City Council on Fil-

tration direct me to request the State Board of Health to kindly advise them:

1st. As to the necessity of purifying the water supply of the city of Providence, and if, in the opinion of the Board, there exists any liability of contamination productive of disease.

2d. As to the practicability of purifying this water by means of filtration either natural or mechanical.

3d. As to the liability of injury arising to the users of water which has been filtered by the use of alum.

Awaiting your early consideration of this matter, I am,

Very respectfully yours,

D. F. HAYDEN,

Clerk of Committee.

STATE BOARD OF HEALTH OF R. I.,
OFFICE OF THE SECRETARY,
48 WEYBOSSET ST., PROVIDENCE, R. I., Jan. 5, 1899.

To the Joint Special Committee, City Council on Filtration, Providence.

GENTLEMEN:—In answer to your request concerning the filtration of the Pawtuxet supply, it may be stated that it is the opinion of the State Board of Health that it is necessary to purify the present water supply of the city of Providence, and that there exists at all times the liability of contamination of the supply which may be productive of disease.

Also that, in the opinion of the Board, it is practicable to filter said water by either natural or mechanical methods.

Also that the liability of injury from the use of alum as a coagulant in the so-called mechanical process will not be a source of danger to the health of the consumers of the filtered water, nor will it be of disadvantage to the producers of steam.

The reasons for these conclusions are more fully set forth in the accompanying report.

Yours truly,

A true copy of record, attest: GARDNER T. SWARTS,

Secretary.

In replying to inquiry No. 1 as to the necessity of purifying the water supply of the city of Providence, and if, in the opinion of the Board, there

exists any liability of contamination productive of disease, it may be stated that the water supply of the city of Providence, taken from the Pawtuxet river at the Pettaconsett pumping-station, is derived from a stream which passes through many manufacturing villages. It is an acknowledged fact that this stream receives a certain amount of refuse wastes from the one or more of the mills located on its banks. While the refuse and wastes of nearly all the houses are caught in cess-pools and vaults so that the contents may not reach the stream, yet there is always a possibility of individuals, intentionally or accidentally, contaminating the water. This has been demonstrated by the placing of dead animals in the stream, and, at the time of the last epidemic of typhoid fever in the city of Providence, excreta from a patient suffering from typhoid fever were thrown directly into the stream. Owing to the sources of the stream, and the ponds where water is accumulated in the upper branches of the river, being located in shallow places where decayed trees, stumps, shrubs, and leaves have accumulated for ages, the color and odor of the water is affected, making the same disagreeable to the sense of taste. Although these qualities may not be productive of disease, it does not constitute a pure supply. The decaying matter held in suspension in the upper streams is precipitated in reservoirs at each water-privilege. From time to time the water is drawn off for repairs and, with the admission of fresh water, the sediment is disturbed, causing an unusual amount of contamination for a period.

That the water taken from the river at the Pettaconsett pumping-station is contaminated in its passage by the villages and mills is shown in the results of the chemical and bacteriological analyses made by this Board, monthly, for the past four years.

Samples of water have been gathered from the north branch of the river, at the village of Hope, and also at the village of Washington on the south branch. Both of these localities are situated above any chance of contamination from mills or villages. A third sample, taken on the same day, but a few hours after the first two are taken, is obtained at the intake at Pettaconsett. The analysis of the third sample, compared with the analysis of the other two, showed a greatly increased percentage of contaminating ingredients.

If there existed no accumulations of mills and villages upon the banks of the river it must not be forgotten that the stream is bordered with farming lands which receive from time to time fertilizers in the form of barn-yard refuse and night-soil wastes from human beings. This material may, at any time during heavy storms, be washed into the river, forming

a dangerous pollution and producing a condition favorable to the production of disease, either from the presence of the typhoid bacilli or the bacillus coli communis in great numbers.

This latter condition alone would be adverse to the selection of this stream for a public water supply unless no other supply was obtainable.

The necessity of purification being dependent upon the dangerous contamination present, or to be added, such necessity might be removed by taking the supply from a point above any present contamination, which, as is well known to your committee, is feasible and practicable, as is shown in the report of the State commissioners on the pollution of the Pawtuxet river.

It is possible to connect this supply at the head of the river with the city at a reasonable expense, and the cost of perfect control of the watershed of this stream is within reasonable limits. The question of damages to water-rights below is a matter of information possessed by your legal department, and would have to be considered in taking this supply, and is not considered in this report, which can deal only with the question of health. It must be admitted, however, that the water at this point is still charged with sufficient organic and coloring matter to give a decided woody taste. While it might not be necessary as a matter of safety to filter the water at this point, yet it is believed that the demand of the public for a clear, white, odorless water would in time necessitate filtering the water at this point. It would, however, be safer and preferable, even if filtered, to use the water which is not dangerously contaminated than that which is known to be continuously open to this possibility.

From the foregoing facts it is the opinion and judgment of the State Board of Health that the water taken from this stream at Pettaconsett should be purified before being delivered to consumers.

In reply to queston two, "as to the possibility of purifying the water by means of filtraton, either natural or mechanical," it is assumed that the word "natural" means the English type of filter, consisting of filtration by gravity through sand, and the word "mechanical" meaning filtration by gravity through sand, a coagulant or precipitating substance being added to the water before being poured upon the filtering medium of sand, the same being washed by a reverse current of filtered water, with the resulting attrition of the particles of sand and assistance being afforded by the movement of iron rakes in the sand bed.

As a result of the experience of many cities which have used the sand filtration in Europe, and the many small cities using the mechanical form

of filtration in the United States, and from the reports of the experiments made at Providence and more recently and completely at Louisville, the report of which is now available to your committee, it may be briefly stated that in the opinion of this Board it is practicable to purify the water of the Pawtuxet river by means of filtration; that either form of filtration will give equal efficiency in the removal of bacteria. The natural system is controllable during mild weather, but the difficulty and cost of cleaning the beds when covered with ice is materially increased, and the danger of disturbance of the filtering surface of the beds is liable to occur unless the beds are covered by suitable structures. The mechanical system is necessarily covered, and the cleansing readily and easily controlled by mechanical devices which have been shown to be reliable in operation.

Many differences of advantage and disadvantage may be presented in each method, and, while the question is not asked as to the choice of method, it may be stated that the main difference which may be cited between the two, as operated at the present time, is that it is not always possible to obtain a colorless white water from the Pawtuxet supply when the natural system is used, yet it is possible to obtain those conditions with the mechanical system.

The main reasons for recommending one system or the other, when the question of color and taste is left out, is reported by those experienced in these methods to be dependent upon the comparative first cost and the cost of operation of one or the other, and as this varies with different locations the experience of one city is not applicable to another, and such judgment must depend upon the estimation of the engineering department, with which this Board, unfortunately, is not supplied, but which is obtainable by your committee from your city department.

In answer to question three, "as to the liability of injury arising to the users of water which has been filtered by the use of alum," it may be stated that in over forty cities where it has been used in the process of mechanical filtration no knowledge of any injury to persons or to boilers using the water has ever been reported.

That the amount of alum which would probably be necessary for the coagulation of the organic and other ingredients of the water of the Pawtuxet supply, namely, one-half of a grain to the gallon, would not prove to be a poisonous dose.

As the experience of the filtration experiments conducted at Louisville and at Providence show that no alum is to be found in the filtered water,

it would not be necessary to take this into consideration, and it is not believed by the Board that the alum used in this manner would prove injurious to users of water filtered by this means.

Very respectfully submitted,

A true copy, attest: GARDNER T. SWARTS,

Secretary.

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GENERAL LAWS.

CHAPTER 96.

Of the State Board of Health.

The state board of health, appointment; vacancies, how filled; removals, how made.

SECTION 1. The governor, with the advice and consent of the senate, shall appoint six persons, two from the county of Providence and one from each of the other counties, who shall constitute the state board of health, one of whom shall be appointed in each year for the term of six years from the first day of July. Any appointment to fill a vacancy shall be for the remainder of the term. Of the persons so appointed, at least three shall be well-educated physicians and members of some medical society incorporated by the state. The governor may remove any member, for cause, at any time, upon the written request of two-thirds of the board.

Duties of the board with reference to life and health among the citizens of the state.

SEC. 2. The board shall take cognizance of the interests of life and health among the citizens of the state; they shall make investigations into the causes of disease, and especially of epidemics and endemics among the people, the sources of mortality, and the effects of localities, employments, conditions and circumstances on the public health, and shall do all in their power to ascertain the causes and the best means for the prevention of diseases of every kind in the state. They shall publish and circulate, from time to time, such information as they may deem to be important and useful for diffusion among the people of the state, and shall investigate and give advice in relation to such subjects, relating to the public health, as may be referred to them by the general assembly, or by the governor when the general assembly is not in session.

To investigate diseases among cattle, etc.

SEC. 3. The state board of health shall also investigate the subject of diseases among cattle or other animals.

Meetings.

SEC. 4. The board shall meet in the city of Providence once in three months, and as much oftener as they may deem necessary.

Compensation. No member of the board, except the secretary, shall receive any compensation for his services; but the actual personal expenses of any member, while engaged in the duties of the board, shall be paid by the state.

Secretary. SEC. 5. The board shall elect a well-qualified physician as their secretary, who shall be *ex-officio* a member of the board, the commissioner of public health, and state registrar; but he shall not be permitted to vote on any question in which he is personally interested.

Duties of secretary. SEC. 6. The secretary of the board shall make inquiry, from time to time, of the clerks of town and local boards of health and practicing physicians, in relation to the prevalence of any disease, or knowledge of any known or generally believed source of disease or causes of general ill-health, and also in relation to the proceedings of the said boards of health, in respect of acts for the promotion and protection of the public health, and also in relation to diseases among domestic animals in their several towns; and the said clerks of town and local boards of health and said practicing physicians shall give information, in reply to said inquiries, of such facts and circumstances as shall have come to their knowledge.

Same subject. SEC. 7. The secretary shall perform and superintend the work prescribed for said board by law, and such other duties as the board may require; he shall prepare and publish, in every calendar month, a general summary of all the deaths, and causes of the same, which have occurred in the state during the preceding month, the same to be made up from returns of deaths which shall be made to him on or before the tenth day of the month following the date of such deaths, by the several town clerks, the city registrar of Providence, and the city clerks of the other cities; he shall also prepare and publish for general distribution a monthly circular giving information and advice in regard to the preservation of health, suitable for each particular season, and giving also such information as he shall deem of advantage to the public, as to the prevalence and character of infectious diseases of domestic animals. He shall hold his office during the pleasure of the board, and may be removed at any regular meeting by a majority vote of the members of said board.

Office and expense of the board. SEC. 8. The governor shall provide a suitable office for the board in the city of Providence; and the actual expenses of the board and of the members thereof, when certified by the chairman and approved by the governor, shall be paid from the state treasury.

SEC. 9. The board shall make a report in print to the general

assembly, annually, of its proceedings during the year ending on the thirty-first day of December next preceding, with such suggestions in relation to the sanitary laws and interests of the state as they shall deem important. To report annually.

CHAPTER 165.

Of the Practice of Medicine.

SECTION 1. It shall be the duty of each town and city clerk to purchase a book of suitable size, to be known as the "medical register" of each city or town, and to set apart one full page for the registration of each physician; and when any physician shall die, or remove from the city or town, said clerk shall make a note of the same at the bottom of the page, and shall, on the first day of January in each year, transmit to the office of the state board of health a duly-certified list of the physicians of said city or town registered under this chapter, together with such other information as is hereinafter required, and perform such other duties as are required by this chapter; and such clerk shall receive the sum of fifty cents from each physician so registered, which shall be his full compensation for all the duties required under this chapter. Register of physicians to be kept by city and town clerks. Annual list to state board of health. Compensation.

SEC. 2. It shall be unlawful for any person to practice medicine or surgery in any of its branches, within the limits of this state, who has not exhibited and registered, in the city or town clerk's office of the city or town in which he or she resides, his or her authority for so practicing medicine as herein prescribed, together with his or her age, address, place of birth, and the school or system of medicine to which he or she proposes to belong; and the person so registering shall subscribe, and verify by oath before such clerk, an affidavit containing such facts, which, if willfully false, shall subject the affiant to conviction and punishment for perjury. Practice of medicine is unlawful without registration of certificate of authority.

SEC. 3. Authority to practice medicine under this chapter shall be a certificate from the state board of health, and said board shall, upon application, issue a certificate to any reputable physician who is practicing or who desires to begin the practice of medicine or surgery in this state, who possesses any of the following qualifications: Certificate of authority, by and to whom issued.

First. A diploma from a reputable and legally chartered medical college, endorsed as such by the state board of health. Diploma.

Evidence of honorable practice prior to January 1, 1892.

Second. Satisfactory evidence from the person claiming the same that such person was reputably and honorably engaged in the practice of medicine or surgery, in this state, prior to January first, eighteen hundred ninety-two.

Examination of any person not qualified as above; fee therefor, and how applied.

Any person not qualified as hereinbefore provided, before practicing medicine or surgery in this state shall present himself before said state board of health and submit himself to such examination as said board may require. Said board shall examine any person presenting himself, and if the examination is satisfactory shall issue its certificate as hereinbefore provided: *Provided*, any person so presenting himself shall pay to the board the sum of ten dollars for each examination; and said fee shall in no case be returned, and shall be applied to pay the expenses of the board of health.

Credentials, how presented.

Applicants may present their credentials by mail or by proxy, and the board shall issue its certificates to such applicants as are entitled thereto as though the applicant were present. All the certificates shall be signed by the president and secretary and attested by seal of the board, and not more than two dollars shall be charged for any certificate.

Certificates to be how signed; fee therefor.

Itinerant doctors are precluded.

SEC. 4. Nothing in this chapter shall be so construed as to authorize any itinerant doctor to register or to practice medicine in any part of this state.

Certificates may be refused or be revoked, when.

SEC. 5. The state board of health may refuse to issue the certificate, provided for in section three of this chapter, to any individual guilty of grossly unprofessional conduct of a character likely to deceive or defraud the public, and it may, after due notice and hearings, revoke such certificates for like cause. In all cases of refusal or revocation the applicant may appeal to the appellate division of the supreme court, which may affirm or overrule the decision of the board.

To whom this chapter does not apply.

SEC. 6. Nothing in this chapter shall be so construed as to discriminate against any particular school or system of medicine, or to prohibit women from practicing midwifery, or to prohibit gratuitous services in case of emergency; nor shall this chapter apply to commissioned surgeons of the United States army, navy, or marine-hospital service, or to legally-qualified physicians of another state called to see a particular case, but who do not open an office or appoint any place in this state where they may meet patients or receive calls.

Secretary of state board of health not required to give security for costs.

SEC. 7. Complaints for violation of the provisions of this chapter shall be made by the secretary of said board, and said secretary shall be exempt from giving surety for costs on any complaint made as aforesaid.

Penalties.

SEC. 8. Any person living in this state, or any person coming into this state, who shall practice medicine or surgery or attempt to practice medicine or surgery in any of its branches, or who shall perform or attempt to perform any surgical operation for or upon any person within the limits of this state, for reward or compensation, in violation of the provisions of this chapter, shall, upon conviction thereof, be fined fifty dollars, and upon each and every subsequent conviction shall be fined one hundred dollars and imprisoned thirty days, or either or both, in the discretion of the court; and in no case, where any provision of this chapter has been violated, shall the person so violating be entitled to receive compensation for services rendered. To open an office for such purpose, or to announce to the public in any other way a readiness to practice medicine or surgery in this state, shall be to engage in the practice of medicine within the meaning of this chapter.

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As the result of a fire occurring in the works of the State binder, the *Registration Report for the year 1897*, which would have been issued with this volume, was destroyed. It was not deemed necessary to reprint this report inasmuch as a certain number of copies had already been issued as a separate registration report, which is available for reference.

GARDNER T. SWARTS.

Secretary.